SECTION I

SUBJECT AREA AND COURSE NUMBER

COMP 672

COURSE TITLE	ALTERNATE TITLE(S)
AWS ACADEMY CLOUD ARCHITECTURE	AWS CLOUD COMPUTING
	AWS CLOUD COMPUTING 2
	AWS CCA
	CLOUD COMPUTING 2

TYPE COURSE

NON-FEE   VOCATIONAL

CATALOG COURSE DESCRIPTION

The course is designed to help students develop technical expertise in cloud computing on the Amazon Web Services (AWS) platform. Emphasis is placed on the ability to effectively demonstrate knowledge of how to architect and deploy secure and robust applications on a cloud computing platform. Topics focus on the ability to define a solution using cloud computing architectural design principles and provide implementation guidance based on best practices throughout the lifecycle of the project. (FT)

LECTURE / LABORATORY HOURS
72 - 96

ADVISORIES

COMP 671 AWS Academy Cloud Foundations or equivalent; AND
COMP 608 Basic Network Configuration or equivalent; AND
COMP 612 Hardware Service Technician or equivalent; OR
COMP 640 Windows Operating Systems or equivalent; OR
COMP 641 Linux Essentials or equivalent

RECOMMENDED SKILL LEVEL

Possess a 12th grade reading level; ability to communicate effectively in the English language; knowledge of math concepts at the 8th grade level and intermediate computer literacy.

INSTITUTIONAL STUDENT LEARNING OUTCOMES

1. Social Responsibility
    SDCE students demonstrate interpersonal skills by learning and working cooperatively in a diverse environment.
2. Effective Communication
    SDCE students demonstrate effective communication skills.
3. Critical Thinking
    SDCE students critically process information, make decisions, and solve problems independently or cooperatively.
4. Personal and Professional Development
    SDCE students pursue short term and life-long learning goals, mastering necessary skills and using resource management and self advocacy skills to cope with changing situations in their lives.

COURSE GOALS

1. Learn about the value and benefits of cloud computing
2. Learn about methods and tools to maintain security and protect data
3. Explore the AWS Management Console
4. Gain an understanding of storage, compute, and networking options
5. Gain an understanding of database options
6. Explore deployment and management options
7. Learn about recommended architectural principles and best practices
8. Explore how to use a cloud migration roadmap and plan
9. Learn how to make infrastructure scalable
10. Learn about business continuity plans and how to achieve high availability
11. Learn how to automate the deployment of cloud resources and use event-driven scaling
12. Learn to design architectures to decouple infrastructure and reduce interdependencies
13. Explore how to optimize data storage for static content
14. Explore best practices prescribed in the Well-Architected framework
15. Learn to identify and solve common configuration and design issues

COURSE OBJECTIVES

Upon successful completion of the course the students will be able to:

1. Identify the value, benefits, methods, and tools of cloud computing
2. Navigate a cloud computing management console
3. Differentiate between options available in the core services of compute, storage, networking, and databases
4. Differentiate between architectures for data processing and analytics, mobile back-ends, and video transcoding
5. Select and apply the appropriate tools to properly secure cloud implementations
6. Create a cloud migration roadmap and plan
7. Design appropriate cloud architectures to decouple infrastructure and reduce interdependencies
8. Automate the deployment of cloud resources, including event-driven scaling

COURSE OBJECTIVES (CONTINUED)

9. Troubleshoot and solve common design and configuration issues in a cloud environment.

SECTION II

COURSE CONTENT AND SCOPE

1. Cloud Computing Concepts
    1.1. Definitions
        1.1.1. IaaS (Infrastructure as a Service)
        1.1.2. PaaS (Platform as a Service)
        1.1.3. SaaS (Software as a Service)
    1.2. Leveraging
        1.2.1. AS (Auto Scaling)
    1.3. Economics
        1.3.1. Cost Optimization
        1.3.2. TCO (Total Cost of Ownership
2. Core Services
    2.1. Global infrastructure
    2.2. Compute, storage, and networking
        2.2.1. EC2 (Elastic Compute Cloud)
        2.2.2. EBS (Elastic Block Store)
        2.2.3. EFS (Elastic File System)
        2.2.4. VPC (Virtual Private Cloud) Implementation
        2.2.5. AS (Auto Scaling)
        2.2.6. ELB (Elastic Load balancing)
    2.3. Databases
        2.3.1. Database overview
        2.3.2. RDS (Relational Database Service)
        2.3.3. DynamoDB
        2.3.4. Implementation
            2.3.4.1. Selection
            2.3.4.2. Building
            2.3.4.3. Management
    2.4. Security, identity, and access management
        2.4.1. Shared Responsibility model
        2.4.2. IAM (Identity and Access Management)
        2.4.3. CloudTrail
        2.4.4. KMS (Key Management Service)
        2.4.5. MFA (Multi-Factor Authentication)
    2.5. HA (High Availability) and Management
        2.5.1. Elasticity and Load Balancing
        2.5.2. ELB (Elastic Load Balancing)
        2.5.3. CloudWatch
        2.5.4. Auto Scaling
        2.5.5. Trusted Advisor

COURSE CONTENT AND SCOPE (CONTINUED)

3. Cloud Architecture Designs
   3.1. Environment design
      3.1.1. Region selection
      3.1.2. Redundancy
      3.1.3. AZ (Availability Zones)
      3.1.4. VPC (Virtual Private Cloud)
         3.1.4.1. Subnets
         3.1.4.2. Connecting VPCs
      3.1.5. Hybrid cloud integration
         3.1.5.1. On-premise components
         3.1.5.2. Application migration to cloud
   3.2. HA Design
      3.2.1. Concept
      3.2.2. ELB
      3.2.3. Implementation
4. Automation And Serverless Architectures
   4.1. Event-driven scaling
      4.1.1. Enablement
      4.1.2. AS concepts
      4.1.3. Auto Recovery
      4.1.4. Data store scaling
      4.1.5. Lambda and lifecycle hooks
      4.1.6. Notifications
   4.2. Infrastructure Automation
      4.2.1. Environment Automation
      4.2.2. CloudFormation
      4.2.3. Infrastructure as code
      4.2.4. Templates
   4.3. Decoupling infrastructure
      4.3.1. Component decoupling
      4.3.2. Loose coupling strategies
      4.3.3. SQS (Simple Queue Service)
      4.3.4. DynamoDB loose coupling
      4.3.5. API (Application Programming Interface) Gateway
      4.3.6. Lambda decoupling
   4.4. Web-scale storage design
      4.4.1. Web applications
      4.4.2. Asset storage
         4.4.2.1. S3 for static
         4.4.2.2. CloudFront for frequently accessed
      4.4.3. Data storage
         4.4.3.1. Non-relational in DynamoDB
         4.4.3.2. Relational data in RDS
      4.4.4. Caching in CloudFront
      4.4.5. Serverless architecture
         4.4.5.1. AWS Managed Services

COURSE CONTENT AND SCOPE (CONTINUED)

                  4.4.5.2.   Implementation
5. Well-Architected Best practices
    5.1.   Well-Architected Framework
    5.2.   Well-architected Pillars
        5.2.1.   Pillar 1: Security
            5.2.1.1.   Principles
            5.2.1.2.   Key Services
            5.2.1.3.   Security exploit prevention
            5.2.1.4.   Securing and encrypting data
            5.2.1.5.   Authentication
        5.2.2.   Pillar 2: Reliability
            5.2.2.1.   Disaster recovery
            5.2.2.2.   Managed desktops
            5.2.2.3.   Multi-region failover
        5.2.3.   Pillar 3: Performance Efficiency
            5.2.3.1.   Overview
            5.2.3.2.   Performance optimization
        5.2.4.   Pillar 4: Cost Optimization
            5.2.4.1.   Overview
            5.2.4.2.   Key services
            5.2.4.3.   Pricing options
            5.2.4.4.   Instance types
            5.2.4.5.   Cost management tools
            5.2.4.6.
6. Deployment and Implementation
    6.1.   Troubleshooting
        6.1.1.   Instance connection
        6.1.2.   Network performance
        6.1.3.   EBS storage I/O rates
        6.1.4.   RDS CPU load
        6.1.5.   Permissions
    6.2.   Design Patterns
        6.2.1.   HA
        6.2.2.   Stream processing
        6.2.3.   Sensors
            6.2.3.1.   Network Data Ingestion
            6.2.3.2.   Processing
        6.2.4.   Application back-ends
        6.2.5.   Video
            6.2.5.1.   Transcoding
            6.2.5.2.   Serving

APPROPRIATE READINGS

Appropriate readings may include, but are not limited to, periodicals, magazines, instructor-written materials, manuals, instructor selected URLs, and publications related to the architecting of infrastructures in the AWS cloud environment, including best practices prescribed in the Well-Architected framework.

WRITING ASSIGNMENTS

Appropriate writing assignments may include, but are not limited to, preparing text for an assigned project, documenting all laboratories and project work, and completing all written assigned reports, such as creating a cloud migration roadmap and plan.

OUTSIDE ASSIGNMENTS

Outside assignments may include, but are not limited to, reading texts and reference resources; research as needed to complete projects, such as how cloud computing is used to deliver data and services; and organizing and preparing written answers to assigned questions.

APPROPRIATE ASSIGNMENTS THAT DEMONSTRATE CRITICAL THINKING

Assignments which demonstrate critical thinking may include, but are not limited to, analysis and evaluation of assigned text and reference resources, and utilize this analysis in classroom discussions, performing laboratory activities, and identify and solve common cloud computing configuration and design issues. Students must select appropriate methods and resources needed to complete laboratory assignments.

EVALUATION

A student's grade will be based on multiple measures of performance and will include evaluation of student's ability to:

1. Perform in a variety of activities and assignments related to the course objectives.
2. Complete written and practical examinations.
3. Contribute to class and group discussions.
4. Maintain attendance and punctuality per current policy.
5. Demonstrate ability to work independently and as a team member.
6. Demonstrate troubleshooting skills.

Upon successful completion of each course in the program, a Certificate of Course Completion will be issued. Upon successful completion of all courses included in the program, a Certificate of Program Completion will be issued.

METHOD OF INSTRUCTION

Methods of instruction may include, but are not limited to, lectures, self-paced lab, demonstrations, individualized study, use of audio-visual aids, group/team work, tutorials, outside assignments, guest lectures, field trips, and guided student job assignments.

This course, or sections of this course, may be offered through distance education.

TEXTS AND SUPPLIES

AWS Academy Cloud Computing Architecture, AWS Academy, LMS
AWS Certified Solutions Architect Study Guide: Associate SAA-C01 Exam, Ben Piper, David Clinton, Wiley Publishing, current edition

Web Resources:
https://docs.aws.amazon.com/index.html
https://aws.amazon.com/console/
https://aws.amazon.com/training/

Supplies: Journal (composition book), USB Drive or other storage media

PREPARED BY: Richard Gholson   DATE: November 6, 2019

REVISED BY: DATE:

Instructors must meet all requirements stated in Policy 3100 (Student Rights, Responsibilities and Administrative Due Process), and the Attendance Policy set forth in the Continuing Education Catalog.

REFERENCES:

San Diego Community College District Policy 3100
California Community Colleges, Title 5, Section 55002
Continuing Education Catalog