

CNSE M106: CLOUD ARCHITECTURE

Originator

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College

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Attach Support Documentation (as needed)

Gartner Forecasts Worldwide Public Cloud Revenue to Grow 17.pdf
 BLS_Computer Network Architects _ Occupational Outlook Handbook _ USA.pdf
 team_2_cloud_9_leadership_academy_team_project_report_final_5-8-19.pdf
 Regional Advisory Meeting-Agenda_May 17_19.docx
 Linked_IN_The Skills Companies Need Most in 2019 – And How to Learn Them.pdf
 Global_Knowledge_10 Most Important IT Skills for 2019.pdf
 CNSE M106_state approval letter_CCC000616422.pdf

Discipline (CB01A)

CNSE - Computer Netwrk Sys. Engr. Prg

Course Number (CB01B)

M106

Course Title (CB02)

Cloud Architecture

Banner/Short Title

Cloud Architecture

Credit Type

Credit

Honors

No

Start Term

Fall 2020

Catalog Course Description

Provides training for students who seek an overall understanding of designing distributed applications and systems in the cloud. Includes a detailed overview of designing and deploying scalable, highly available, and fault-tolerant systems.

Additional Catalog Notes

This course helps prepare students to pass the Amazon Web Services (AWS) Cloud Architect Exam from Amazon.com.

Taxonomy of Programs (TOP) Code (CB03)

0708.00 - *Computer Infrastructure and Support

Course Credit Status (CB04)

D (Credit - Degree Applicable)

Course Transfer Status (CB05) (select one only)

B (Transferable to CSU only)

Course Basic Skills Status (CB08)

N - The Course is Not a Basic Skills Course

SAM Priority Code (CB09)

C - Clearly Occupational

Course Cooperative Work Experience Education Status (CB10)

N - Is Not Part of a Cooperative Work Experience Education Program

Course Classification Status (CB11)

Y - Credit Course

Educational Assistance Class Instruction (Approved Special Class) (CB13)

N - The Course is Not an Approved Special Class

Course Prior to Transfer Level (CB21)

Y - Not Applicable

Course Noncredit Category (CB22)

Y - Credit Course

Funding Agency Category (CB23)

Y - Not Applicable (Funding Not Used)

Course Program Status (CB24)

1 - Program Applicable

General Education Status (CB25)

Y - Not Applicable

Support Course Status (CB26)

N - Course is not a support course

Field trips

Will not be required

Grading method

(L) Letter Graded

Alternate grading methods

(E) Credit by exam, license, etc.

Does this course require an instructional materials fee?

No

Repeatable for Credit

No

Is this course part of a family?

No

Units and Hours

Carnegie Unit Override

No

In-Class

Lecture

Minimum Contact/In-Class Lecture Hours

35

Maximum Contact/In-Class Lecture Hours

35

Activity

Laboratory

Minimum Contact/In-Class Laboratory Hours

52.5

Maximum Contact/In-Class Laboratory Hours

52.5

Total in-Class

Total in-Class

Total Minimum Contact/In-Class Hours

87.5

Total Maximum Contact/In-Class Hours

87.5

Outside-of-Class

Internship/Cooperative Work Experience

Paid

Unpaid

Total Outside-of-Class

Total Outside-of-Class

Minimum Outside-of-Class Hours

70

Maximum Outside-of-Class Hours

70

Total Student Learning

Total Student Learning

Total Minimum Student Learning Hours

157.5

Total Maximum Student Learning Hours

157.5

Minimum Units (CB07)

3

Maximum Units (CB06)

3

Student Learning Outcomes (CSLOs)

Upon satisfactory completion of the course, students will be able to:

- | | |
|---|---|
| 1 | explain how scalability, high availability, and fault-tolerance is achieved in the cloud. |
| 2 | select the best cloud service based on data, compute, database, or security requirements. |

Course Objectives

Upon satisfactory completion of the course, students will be able to:

- | | |
|----|--|
| 1 | choose reliable or resilient storage. |
| 2 | determine how to design decoupling mechanisms using cloud services. |
| 3 | determine how to design a multi-tier architecture solution. |
| 4 | determine how to design high availability and/or fault tolerant architectures. |
| 5 | choose performance storage and databases. |
| 6 | apply caching to improve performance. |
| 7 | design solutions for elasticity and scalability. |
| 8 | determine how to secure data and application tiers. |
| 9 | define the networking infrastructure for a single virtual private cloud. |
| 10 | determine how to design cost-optimize compute and storage. |
| 11 | choose design features in solutions that enable operational excellence. |

Course Content

Lecture/Course Content

- **5% - Introduction to Cloud Computing**
 - What is Cloud Computing?
 - Leveraging Cloud Computing
 - Cloud Economics and Total Cost of Ownership
- **25% - Getting Started with Services**
 - AWS (Amazon Web Services) Infrastructure
 - AWS Compute, Storage, and Networking
 - AWS Security, Identity, and Access Management
 - AWS Database Options
 - AWS Elasticity and Management Tools
- **20% - AWS Architecting**
 - AWS Essentials Review
 - Designing Your Environment
 - System Design for High Availability
- **25% - Automations and Serverless Architectures**
 - Event-Driven Scaling
 - Automating Your Infrastructure
 - Decoupling Your Infrastructure
 - Designing Web-Scale Storage
- **20% - Well-Architected Best Practice**
 - Introducing the Well-Architected Framework
 - Well-Architected Pillar 1: Security
 - Well-Architected Pillar 2: Reliability
 - Well-Architected Pillar 3: Performance Efficiency
 - Well-Architected Pillar 4: Cost Optimization
- **5% - Well-Architected Best Practice**
 - Troubleshooting
 - Design Patterns and Sample Architectures

Laboratory or Activity Content

- 6% - Creating Amazon EC2 instances with Microsoft Windows
- 6% - Build Your Virtual Private Cloud (VPC) and Launch a Web Server
- 6% - Working with Amazon Elastic Block Store (EBS)
- 6% - Introduction to AWS Identity and Access Management (IAM)
- 6% - Build Your Database Server and Interact with Your Database Using an Application
- 6% - Scale and Load Balance Your Architecture
- 6% - Deploy a Web Application on AWS
- 6% - Making Your Environment Highly Available

- 6% - Using Auto Scaling with AWS Lambda and Lifecycle Hooks
- 6% - Creating an Amazon VPC with AWS CloudFormation
- 6% - Caching Static Files with Amazon CloudFront
- 6% - Implementing a Serverless Architecture with AWS Managed Services
- 6% - Multi-Region Failover with Amazon Route 53
- 6% - Launching EC2 Spot Instances with Auto Scaling and Amazon CloudWatch
- 6% - Using AWS Services to Enhance a Web Application
- 10% - Final Cloud Design Project

Methods of Evaluation

Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):

Problem solving exercises
Skills demonstrations

Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):

Computational homework
Group projects
Individual projects
Laboratory activities
Laboratory reports
Oral analysis/critiques
Objective exams
Oral presentations
Other (specify)
Problem-solving exams
Quizzes
Reports/papers
Skills demonstrations
Skill tests or practical examinations
Simulations

Other

Passing Cloud relevant certification

Instructional Methodology

Specify the methods of instruction that may be employed in this course

Audio-visual presentations
Computer-aided presentations
Collaborative group work
Class activities
Case studies
Distance Education
Group discussions
Guest speakers
Instructor-guided interpretation and analysis
Instructor-guided use of technology
Internet research
Laboratory activities
Lecture
Small group activities

Describe specific examples of the methods the instructor will use:

Instructor will integrate a learning management system, e.g., Canvas, for supplemental support such as providing lab supplemental materials and whitepapers. Curriculum may be provided via Amazon Web Services Academy and AWS Educate for viewing of pre-recorded lectures, labs, demonstrations, and knowledge assessments.

Lab: Instructor will provide instructions on lab exercises along with screen prints explaining detailed steps. Labs will include instructor's comments and observations for students to note while completing labs. Students will be expected to complete labs multiple times and be able to explain why specific configurations are being deployed. Students are also expected to troubleshoot and verify working cloud configurations. Students will submit labs that are automatically scored online and submit completion scores as evidence of completion using a learning management system (LMS), for example, Canvas or Blackboard. Labs utilize a credit system

which provides a sandboxed cloud configuration environment of equipment, resources, and services at no cost to the student and is subsidized through AWS Academy. This arrangement will allow for repetitive practice of lab work without incurring additional costs.

Representative Course Assignments

Writing Assignments

1. Write about solutions and best practices that a cloud architecture provides.
2. Write technical explanations of configuration in support of architecture configuration improvements.
3. Develop written explanation of specific cloud architecture service along with its benefits.

Critical Thinking Assignments

1. Provide a performance solution that improves a cloud architecture.
2. Provide a reliability, scalability, or availability solution that improves a cloud configuration.
3. Provide a security strategy that improves an existing cloud configuration security posture.
4. Migrate an existing in-house configuration to the cloud and explain the benefits of the new cloud architecture.
5. Review and discuss 3rd party exam questions and provide explanations that support solutions.

Reading Assignments

1. Review and explain the benefits of various Amazon web services.
2. Review in depth a specific cloud service from a competitor to Amazon.
3. Review an AWS whitepaper and provide a short explanation of the benefit of this architecture or service, best practice, or recommendation.
4. Review prominent AWS whitepapers such as Security Best Practices.

Skills Demonstrations

1. Given a list of cloud requirements, complete a semi-complex lab architecture without having detailed step-by-step instructions.
2. Given an on-premise topology, recommend a cloud migration pathway.
3. Given a cloud configuration diagram, configure the necessary components and services that meet the technical requirements.
4. Given a cloud architecture, explain the benefits and best practices of that specific deployment in the cloud.

Outside Assignments

Representative Outside Assignments

1. Research topics related to new cloud solutions and offer additional improvements related to performance, scalability, security, availability, cost optimization or other pertinent improvements.
2. Research new cloud tools and how they provide modern solutions in system and network protection.
3. Migrate an existing in-house configuration to the cloud and explain the benefits of the new cloud architecture.
4. Research and explain cloud case studies.
5. Provide an analysis of specific cloud whitepapers.

Articulation

Equivalent Courses at other CCCs

College	Course ID	Course Title	Units
Santa Monica College	CS 79C	Compute Engines in the Cloud	3
Orange Coast College	CIS A281	Cloud Infrastructure and Services	3

District General Education

- A. Natural Sciences**
- B. Social and Behavioral Sciences**
- C. Humanities**
- D. Language and Rationality**
- E. Health and Physical Education/Kinesiology**
- F. Ethnic Studies/Gender Studies**

Course is CSU transferable

Yes

CSU Baccalaureate List effective term:

Fall 2020

CSU GE-Breadth

Area A: English Language Communication and Critical Thinking

Area B: Scientific Inquiry and Quantitative Reasoning

Area C: Arts and Humanities

Area D: Social Sciences

Area E: Lifelong Learning and Self-Development

Area F: Ethnic Studies

CSU Graduation Requirement in U.S. History, Constitution and American Ideals:

IGETC

Area 1: English Communication

Area 2A: Mathematical Concepts & Quantitative Reasoning

Area 3: Arts and Humanities

Area 4: Social and Behavioral Sciences

Area 5: Physical and Biological Sciences

Area 6: Languages Other than English (LOTE)

Textbooks and Lab Manuals

Resource Type

Textbook

Classic Textbook

No

Description

Piper, Ben, and David Clinton. *AWS Certified Solutions Architect Study Guide: Associate SAA-C01 Exam*. 2nd. ed., Sybex, 2019.

Resource Type

Websites

Description

<https://AWS.Training.com> - Moorpark Colleges CNSE program is an approved Amazon Web Services Academy and can provide access to professional curriculum of videos, lectures, quizzes and online lab exercises. Access is only to approved Academies that have completed faculty training and certification criteria

AWS Educate provides additional supplemental resources

Quiklabs provides various lab exercises for Amazon Lab environments

Udemy provides sample Certification Exam Banks

Resource Type

Textbook

Description

Banerjee, Joyjeet. *AWS Certified Solutions Architect Associate All-in-One Exam Guide (Exam SAA-C01)*. McGraw-Hill, 2018.

Library Resources**Assignments requiring library resources**

Research, using the Library's print and online resources.

Sufficient Library Resources exist

Yes

Example of Assignments Requiring Library Resources

Research for a paper on topics such as modern security tools, modern threats and vulnerabilities, and data analysis.

Distance Education Addendum**Definitions****Distance Education Modalities**

Hybrid (51%–99% online)
 Hybrid (1%–50% online)
 100% online

Faculty Certifications

Faculty assigned to teach Hybrid or Fully Online sections of this course will receive training in how to satisfy the Federal and state regulations governing regular effective/substantive contact for distance education. The training will include common elements in the district-supported learning management system (LMS), online teaching methods, regular effective/substantive contact, and best practices.

Yes

Faculty assigned to teach Hybrid or Fully Online sections of this course will meet with the EAC Alternate Media Specialist to ensure that the course content meets the required Federal and state accessibility standards for access by students with disabilities. Common areas for discussion include accessibility of PDF files, images, captioning of videos, Power Point presentations, math and scientific notation, and ensuring the use of style mark-up in Word documents.

Yes

Regular Effective/Substantive Contact

Hybrid (1%–50% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Other DE (e.g., recorded lectures)	Same as 100% online but done in front of a classroom with supportive explanation.

Hybrid (51%–99% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Other DE (e.g., recorded lectures)	Same as 100% online but done in front of a classroom with supportive explanation.

100% online Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Other DE (e.g., recorded lectures)	100% online but additional supplemental materials provided including on campus availability and Zoom conferences as optional student support.

Examinations

Hybrid (1%–50% online) Modality

Online
On campus

Hybrid (51%–99% online) Modality

Online
On campus

Primary Minimum Qualification

COMPUTER INFORMATION SYS

Additional local certifications required

7+ years of Info Technology experience and a relevant Amazon Web Services Cloud Certification.

Review and Approval Dates

Department Chair

02/11/2020

Dean

02/12/2020

Technical Review

02/20/2020

Curriculum Committee

MM/DD/YYYY

DTRW-I

03/12/2020

Curriculum Committee

MM/DD/YYYY

Board

04/14/2020

CCCCO

04/23/2020

Control Number

CCC000616422

DOE/accreditation approval date

MM/DD/YYYY