# CIS 107 - Administering Cloud Services and Containers

**COLLEGE:**
Merritt College

**ORIGINATOR:** Brown, Courtney

**DIVISION/DEPARTMENT:**
Merritt - Division II/M - Technology

**STATE CONTROL NUMBER:** CCC000617820

**DATES:**
**BOARD OF TRUSTEES APPROVAL DATE:** 05/26/2020
**STATE APPROVAL DATE:** 05/31/2020
**CURRICULUM COMMITTEE APPROVAL DATE:** 04/23/2020
**REQUISITE VALIDATION:** 02/03/2018

**CURRENT EFFECTIVE DATE:** 01/01/2021

## 1. REQUESTED CREDIT CLASSIFICATION:

D - Credit - Degree Applicable

N - Not Basic Skills

1 - Program Applicable

## 2. DEPT/COURSE NO:

CIS 107

## 3. COURSE TITLE:

Administering Cloud Services and Containers

## 4. COURSE:

**Course**
MC New Course w/DE Addendum

**TOP NO.** 0702.00 - Computer Information Systems*

## 5. UNITS:

**Variable** No

**Units (Min)** 3.000

**Min Total**

Hours

**Lecture Hours (Min)** 2.000

35

**Lab/Studio/Activity Hours (Min)** 3.000

52.5

## 6. SELECTED TOPIC:

**NO. OF TIMES OFFERED AS SELECTED TOPIC:**

**AVERAGE ENROLLMENT:**

## 7. JUSTIFICATION FOR COURSE:

Many companies now offer virtual infrastructure that can be used to build business information systems and applications. Products such as Amazon Web Services (AWS), IBM Bluemix, and Microsoft Azure represent a growing collection of integrated public cloud services including analytics, Virtual Machines, databases, mobile, networking, storage, and web. These building blocks are available to the public through low cost usage-based plans. This course provides instruction in formulating Information Technology solutions from these high level building blocks. These technologies permit entrepreneurs, start-ups, and other businesses to avoid the purchase of capital equipment such as servers and networks switches. This course is a restricted elective for the Computer Science AS degree

## 8. COURSE/CATALOG DESCRIPTION

Administration of cloud-based information systems: Deployment and management of Infrastructure-as-a-Service (IaaS), Software-as-a-Service (SaaS), and Platform-as-a-Service (PaaS) information systems; performance and redundant deployment of Virtual Machines (VMs), and Command Line Interfaces (CLI) systems management; and deployment of information systems and services without purchase of physical hardware.

## 9. OTHER CATALOG INFORMATION

**a. Modular:** No

**If yes, how many modules:**

**b. Open entry/open exit:** No

**c. Grading Policy:** Both Letter Grade or Pass/No Pass

**d. Eligible for credit by Exam:** No

**e. Repeatable according to state guidelines:** No

**f. Required for degree/certificate (specify):**

**g. Meets GE/Transfer requirements (specify):**

**h. C-ID Number:**

**Expiration Date:**

**i. Are there prerequisites/corequisites/recommended preparation for this course?** Yes

## 10. LIST STUDENT PERFORMANCE OBJECTIVES (EXIT SKILLS):

**If an Objective cannot be deleted, make sure a Content-Review found in the Content Validation Page is not using that objective.**

Objectives

1. **Configure cloud services administration profile and account.**
2. **Deploy Virtual Machines.**
3. **Configure information system scaling and redundancy.**
4. **Create report on cost of deployed infrastructure.**

## 11. COURSE CONTENT:

LECTURE CONTENT:

1. Understanding Cloud service platforms (20%)
    1. Accounts and credentials
    2. Dashboards
    3. Public Key Infrastructure (PKI)
    4. Remote access methods
    5. Billing and usage accounting
2. Cloud service solution bundles (10%)
    1. Infrastructure
    2. Mobile
    3. Web
    4. Media
    5. Identity and access management
    6. Development and testing
    7. Data management
3. Compute services (10%)
    1. Web Sites
    2. Virtual Machines (VM)
    3. Cloud services
    4. Mobile services
4. Network services (10%)
    1. Virtual networks
    2. Traffic management
5. Data services (10%)
    1. SQL and SQLite databases
    2. Cloud SQL Database
    3. NoSQL database
    4. BLOB services
6. App Services (10%)
    1. Directory Services: LDAP, Active Directory
    2. Multi-factor authentication
    3. Message queues

    4. Service bus
    5. Notification hubs
    6. Media services
7. Patterns for defining infrastructure (10%)
    1. Environments
    2. Organizing infrastructure
    3. Basic pipeline designs
    4. Using a local sandbox
8. Patterns for updating and changing Servers (10%)
    1. Patterns for continuous deployment
    2. Patterns for immutable servers
    3. Practices for managing configuration definition
9. Testing infrastructure changes (10%)
    1. Roles and workflow for testing
    2. Change management
    3. Zero down-time changes

LAB CONTENT:

1. Establish Account, Credentials and Services Dashboard (10%)
2. Generate and manage Public/Private Key Pairs for connection to remote servers without login credentials (10%)
3. PAAS: Create a multi-tenant application host (15 %)
4. IAAS: Create a diagram documenting components used to fulfill a tenant's Infrastructure Needs (15 %)
5. SAAS: Identify appropriate software Stock Keeping Unit (SKU) and install it on a multi-tenant server(15 %)
6. Manage entire Virtual Machines life cycle through Command Line Interface (CLI) and Portal.(15 %)
7. Reading reference manuals on the different services, service levels, components, and geographic diversity available at targeted subscription level. Creating a document describing: 1) Business continuity under disaster conditions. 2) Disaster recovery and return to normal business operation. (10%)
8. Create a diagram illustrating the Topology of a business information system that meets assigned specifications. Create a document containing the recurring fees of the design at different levels of use. (10%)

## 12. METHODS OF INSTRUCTION (List methods used to present course content):

- Lecture
- Lab
- Observation and Demonstration
- Discussion
- Critique
- Projects
- Visiting Lecturers
- Work Experience
- Directed Study

- Service Learning
- Multimedia Content
- Threaded Discussions

**Other Methods:**

## 13. ASSIGNMENTS

**Out-of-class Assignments (List all assignments, including library assignments. Requires two (2) hours of independent work outside of class for each unit/weekly lecture hour. Outside assignments are not required for lab-only courses, although they can be given.)**

**Override Outside Class Hours:** No

**Outside-of-Class Hours (Min)** 4.000

**Outside-of-Class Hours (Max)** 0.000

**Override Outside-of-Class Hours (Min)** 0.000

**Override Outside-of-Class Hours (Max)** 0.000

**Out of class Assignment**
PAAS:
1) Use portal and a script to load all of a tenant's user credentials
2) Validate security configuration that prevents cross-tenant snooping.
3) Produce a per-tenant activity and billing report.

IAAS:
1) Deploy infrastructure using portal or script.
2) Configure infrastructure  monitoring and accounting.
3) Include diagram and sample billing report in a presentation.

SAAS:
1) Configure Lightweight Directory Access Protocol (LDAP) or Active Directory (AD) schema to provision per-client storage for each user in a tenant's group.
2) Link each user's credentials to the correct service and billing profile.
3) Use portal and script to activate client subscriptions. 4) Use portal and script to deprecate (deactivate but not delete) client subscriptions.
4) Use portal and script to delete client subscriptions.

## 14. STUDENT ASSESSMENT: (Grades are based on):

- ESSAY (Includes "blue book" exams and any written assignment of sufficient length and complexity to require students to select and organize ideas, to explain and support the ideas, and to demonstrate critical thinking skills.)
- COMPUTATION SKILLS
- NON-COMPUTATIONAL PROBLEM SOLVING (Critical thinking should be demonstrated by solving unfamiliar problems via various strategies.)

- SKILL DEMONSTRATION
- MULTIPLE CHOICE
- OTHER (Describe)

**OTHER (Describe):**
Projects and Labs

## 15. TEXTS, READINGS, AND MATERIALS

A. Textbooks:
**YesNo37**
Tulloch, Mitch. *Introducing Windows Azure for IT Professionals*. 1 edition Microsoft Press, 2013.
Stephen Cole, Gareth Digby, Chris Fitch, Steve Friedberg, Shaun Qualheim, Jerry Rhoads, Michael Roth, Blaine Sundrud. *AWS Certified SysOps Administrator Official Study Guide: Associate Exam*. 1 edition Sybex, 2015.
Kavis, Michael J.. *Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS)*. 1 edition Wiley, 2014.

*Date is required: Transfer institutions require current publication date(s) within 5 years of outline addition/update.

B. Additional Resources:
Library/LRC Materials and Services:

The instructor, in consultation with a librarian, has reviewed the materials and services of the College Library/LRC in the subject areas related to the proposed new/updated course
**Print Materials were reviewed?** Yes

**Non-Print Materials were reviewed?** No

**Online Materials were reviewed?** Yes

**Services were reviewed?** Yes

**Specific materials and/or services needed have been identified and discussed. Librarian comments:**
The library provides sufficient information resources in both print and electronic format to support this course. A librarian is available in person at the reference desk or online via chat to assist students whenever the library is open.

C. Readings listed in A and B above are: (See definition of college level):
**YesNo39**
Primarily college level

## 16. DESIGNATE OCCUPATIONAL CODE:

C - Clearly Occupational

## 17. LEVEL BELOW TRANSFER:

Y - Not applicable

## 18. CALIFORNIA CLASSIFICATION CODE:

Y - Credit Course

## 19. NON CREDIT COURSE CATEGORY:

Y - Not Applicable, Credit course

## 20. FUNDING AGENCY CATEGORY:

Y - Not Applicable (funding not used to develop course)

## REQUISITES AND ADVISORIES

**RECOMMENDED PREPARATION:**
CIS 052 Cloud Security Fundamentals and CIS 059 Applications in Information Security and CIS 071 Introduction to Information Systems Security or CIS 072 Systems and Network Administration

## STUDENT LEARNING OUTCOMES

1. **Select appropriate service plans.**

   Prepare a presentation on business needs and map to selected solutions.

2. **Analyze usage metrics and recommend configuration adjustments.**

   Assignment or project modifying an infrastructure that is at its limit or in a condition of imminent failure.

3. **Select information systems configuration that is resistant to modes of failure.**

   Assignment or project implementing an information system that meets High Availability (HA) targets.