

Course Outline for CIS 81C

COMPUTE ENGINES FOR CLOUD COMPUTING

Effective: Spring 2020

I. CATALOG DESCRIPTION:

CIS 81C — COMPUTE ENGINES FOR CLOUD COMPUTING — 3.00 units

In this course, students explore how cloud computing systems are built using a common set of core technologies, algorithms, and design principles centered around distributed systems. Students will use current cloud platforms such as AWS, AZURE to provision, load-balance and scale their applications. The course discusses, from a developer perspective, the most important reasons for using cloud computing and examines the underlying design principles of scalable cloud applications.

3.00 Units Lecture

Strongly Recommended

CIS 81A - Introduction to Cloud Computing with a minimum grade of C

Grading Methods:

Letter or P/NP

Discipline:

- Computer Information Systems

	MIN
Lecture Hours:	54.00
Expected Outside of Class Hours:	108.00
Total Hours:	162.00

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. PREREQUISITE AND/OR ADVISORY SKILLS:

Before entering this course, it is strongly recommended that the student should be able to:

A. CIS81A

1. Describe the cloud computing model, history, vendor perspectives and industry offerings.
2. Describe the process to obtain an Amazon Web Services (AWS) and/or Microsoft AZURE account and establish an account via AWS or AZURE.
3. Use current cloud services from a leading service provider.

IV. MEASURABLE OBJECTIVES:

Upon completion of this course, the student should be able to:

- A. Describe important design consideration for scalable cloud applications
- B. Describe the architectural approach used by AWS or AZURE
- C. Navigate the AWS or AZURE Management Console
- D. Deploy cloud servers and work with various Amazon or AZURE Machine Images

V. CONTENT:

- A. AWS access
 1. AWS account acquisition
 2. AWS command line interface
 3. AWS Educate account acquisition
- B. Cloud computing concepts
 1. Business drivers
 2. Cloud computing models
 3. Security and compliance
 4. AWS/AZURE/GOOGLE cloud platform overview
- C. Cloud Storage Services
 1. AWS Simple Storage Service (S3) object storage
 - a. Creation and management of S3 Buckets via CLI

2. AWS Glacier archive storage
3. AWS Elastic File System (EFS) network file storage
4. AWS Elastic Block Store (EBS)
5. AWS Snowball data transport service
6. AWS CloudFront content distribution service
- D. AWS EC2 Instances
 1. Amazon Machine Instance (AMI) instance types
 - a. Machine sizing
 - b. System image types
 2. Secure Login via key pairs
 3. Storage Volumes
 4. Availability zones
 5. IP addressing
 6. Virtual network
 7. Pricing considerations
 8. Security groups
- E. AWS Docker Containers
 1. Concepts
 2. Container benefits
 3. ECS Container Service
 4. Creation and deployment of Docker images with ECS
- F. Serverless Architectures and Microservices
 1. Concepts and benefits (Functions as a Service)
 2. AWS Lambda programming
 3. Serverless best practices
 4. Sample programming with Lambda functions employing DynamoDB
- G. Application environments using AWS Elastic Beanstalk
 1. Create an example Node.js web app using Elastic Beanstalk
 2. Manage the application
- H. Scaling of web servers using AWS Elastic Beanstalk
 1. Creation of scaled and load balanced web application via the Web Interface
 2. Creation of scaled and load balanced web application via the CLI
- I. Basics of AWS Cloud Formation
 1. Provisioning of infrastructure via JSON templates

VI. METHODS OF INSTRUCTION:

- A. **Lecture** - which includes background for the architecture of the specific topics being discussed;
- B. **Written Exercises** - Summary of on-line labs and how they pertain to the business
- C. **Lab** - Various on-line labs demonstrating, creating, manipulating various features of the cloud environment

VII. TYPICAL ASSIGNMENTS:

- A. Using the AWS Console, deploy a game high score calculator
- B. Create AWS IAM Account (Root, Student, Professor)
- C. Create Elastic File System (EFS) via the AWS console

VIII. EVALUATION:

Methods/Frequency

- A. Exams/Tests
 - final exam
- B. Quizzes
 - frequent 4-10
- C. Lab Activities
 - 60% hands-on lab activities

IX. TYPICAL TEXTS:

1. Sarkar, Aurobindo. *Learning AWS: Design, Build, and Deploy Responsive Applications using AWS Cloud Components*. 2 ed., Packt Publishing, 2018.
2. Lucifredi, Ryan. *AWS System Administration*. 1 ed., O'Reilly Publishers, 2018.

X. OTHER MATERIALS REQUIRED OF STUDENTS:

- A. Web browser: any HTML 5 compliant web browser
- B. AWS and/or AZURE account: free for students