UDACITY
FOR ENTERPRISE

THE SCHOOL OF CLOUD COMPUTING

Cloud DevOps Engineer

Overview

Cloud Dev Ops Engineer Nanodegree Degree Program

The Cloud DevOps Engineer Nanodegree program is geared towards operations and software engineering professionals who want to build infrastructure that delivers product and services at both speed and scale.

The program includes projects that teach you how to create continuous integration and continuous delivery (CI/CD) pipelines, deploy massive infrastructure securely using code, and operationalize microservices using Kubernetes, and more.

By the end of the program, you'll have assembled an impressive portfolio of real-world projects, and gained valuable hands-on experience. You'll also receive one-to-one support via profile and portfolios reviews to help make sure you're ready to establish yourself as a successful devops engineer.

The program is delivered in 1 term spread over 4 months.

Program Information

TIME
4 months
Study 10 hours/week

LEVEL
Practitioner

PREREQUISITES
Intermediate programming skills in Javascript and some familiarity with:
- Web development (HTML, CSS)
- Object Oriented Programming
- Linux Command Line Basics
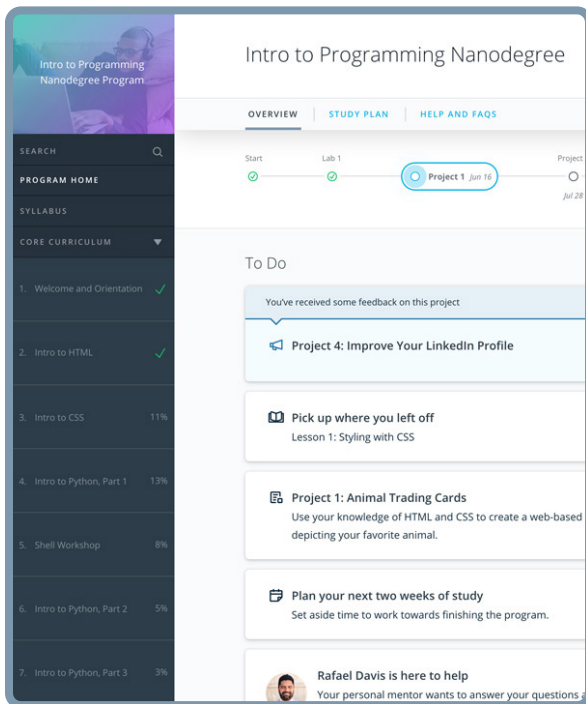
HARDWARE/SOFTWARE REQUIRED
A computer running recent versions of Windows, Mac OS X, or Linux and an unmetered broadband Internet connection. For an ideal learning experience, a computer with Mac or Linux OS is recommended.

LEARN MORE ABOUT THIS NANODEGREE
Contact us at enterpriseNDs@udacity.com.

Our Classroom Experience

REAL-WORLD PROJECTS
Learners build new skills through industry-relevant projects and receive personalized feedback from our network of 900+ project reviewers. Our simple user interface makes it easy to submit projects as often as needed and receive unlimited feedback.

KNOWLEDGE
Answers to most questions can be found with Knowledge, our proprietary wiki. Learners can search questions asked by others and discover in real-time how to solve challenges.

LEARNER HUB
Learners leverage the power of community through a simple, yet powerful chat interface built within the classroom. Learner Hub connects learners with their technical mentor and fellow learners.

WORKSPACES
Learners can check the output and quality of their code by testing it on interactive workspaces that are integrated into the classroom.

QUIZZES
Understanding concepts learned during lessons is made simple with auto-graded quizzes. Learners can easily go back and brush up on concepts at anytime during the course.
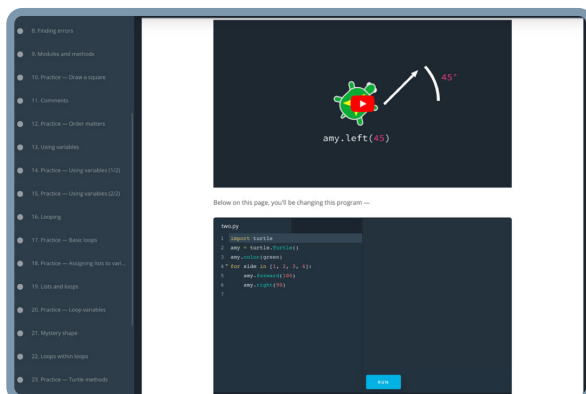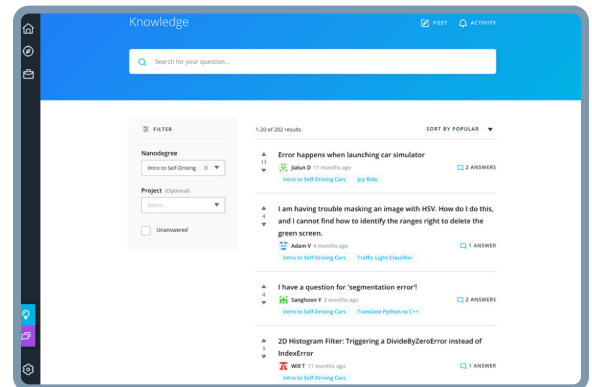
CUSTOM STUDY PLANS
Mentors create a custom study plan tailored to learners' needs. This plan keeps track of progress toward learner goals.

PROGRESS TRACKER
Personalized milestone reminders help learners stay on track and focused as they work to complete their Nanodegree program.

Learn with the Best

Kesha Williams
INSTRUCTOR

Kesha has over 20 years experience in software development and is a software engineering manager at Chick-fil-A, routinely leading innovation teams in proving out the use of cloud services to solve complex business problems. She was recently named an Alexa Champion by Amazon.

Alfredo Deza
INSTRUCTOR

Alfredo Deza is a passionate software engineer, avid open source developer, Vim plugin author, photographer, and former Olympic athlete. He has rebuilt company infrastructure, designed shared storage, and replaced complex build systems, always in search of efficient and resilient environments.

Carlos Rivas
INSTRUCTOR

Carlos is a Senior Solutions Architect at Infiniti Consulting where he helps institutions move traditional data centers to the cloud. He has worked for several large telecommunication providers managing and configuring network infrastructure, using Java, Groovy, Python, Perl, and PHP.

Olin Wread
INSTRUCTOR

Olin is a Senior DevOps Engineer at Figure Eight. He has over 13 years of experience in a variety of DevOps, Systems Engineer, and Systems Administration roles at companies such as Heartflow, Netgear, and Turnitin. Outside work, he enjoys photography and spending time with his daughter.

Noah Gift

INSTRUCTOR

Noah has worked at companies including Disney Feature Animation, Sony Imageworks, Weta Digital, and AT&T. He is a lecturer at universities including Northwestern, UC Berkeley and UC Davis. He is the author of Python for DevOps: Learn Ruthlessly Effective Automation.

Eddy Shyu

CURRICULUM MANAGER

Eddy has worked at BlackRock, Thomson Reuters, and Morgan Stanley, and has an MS in FInancial Engineering from HEC Lausanne. Eddy taught data analytics at UC Berkeley and contributed to Udacity's Self-Driving Car and Artificial Intelligence for Trading programs.

Bryan Okeke

CURRICULUM MANAGER

Bryan's been lead developer for several major companies, including Bytemark, which handles payments for transit authorities in major cities. He is the founder of Beginner Programmers, the largest blockchain meetup group in the world. His bootcamps have taught tens of thousands of people how to code.

Cezanne Camacho

CURRICULUM MANAGER

Cezanne is a machine learning educator with a Masters in Electrical Engineering from Stanford University. Inspired by anyone with the drive and imagination to learn something new, she aims to create more inclusive and effective STEM education.

Our Nanodegree Programs Include:

Pre-Assessments

Our in-depth workforce assessments identify your team's current level of knowledge in key areas. Results are used to generate custom learning paths designed to equip your workforce with the most applicable skill sets.

Dashboard & Progress Reports

Our interactive dashboard (enterprise management console) allows administrators to manage employee onboarding, track course progress, perform bulk enrollments and more.

Industry Validation & Reviews

Learners' progress and subject knowledge is tested and validated by industry experts and leaders from our advisory board. These in-depth reviews ensure your teams have achieved competency.

Real World Hands-on Projects

Through a series of rigorous, real-world projects, your employees learn and apply new techniques, analyze results, and produce actionable insights. Project portfolios demonstrate learners' growing proficiency and subject mastery.

Our Review Process

Real-life Reviewers for Real-life Projects

Real-world projects are at the core of our Nanodegree programs because hands-on learning is the best way to master a new skill. Receiving relevant feedback from an industry expert is a critical part of that learning process, and infinitely more useful than that from peers or automated grading systems. Udacity has a network of over 900 experienced project reviewers who provide personalized and timely feedback to help all learners succeed.

Vaibhav
UDACITY LEARNER

"I never felt overwhelmed while pursuing the Nanodegree program due to the valuable support of the reviewers, and now I am more confident in converting my ideas to reality."

now at
CODING VISIONS INFOTECH

All learners benefit from:

Line-by-line feedback for coding projects	Industry tips and best practices	Advice on additional resources to research	Unlimited submissions and feedback loops

How it Works

Real-world projects are integrated within the classroom experience, making for a seamless review process flow.

- Go through the lessons and work on the projects that follow
- Get help from your technical mentor, if needed
- Submit your project work
- Receive personalized feedback from the reviewer
- If the submission is not satisfactory, resubmit your project
- Continue submitting and receiving feedback from the reviewer until you successfully complete your project

About our Project Reviewers

Our expert project reviewers are evaluated against the highest standards and graded based on learners' progress. Here's how they measure up to ensure your success.

900+	1.8M	3	4.85 /5
Expert Project Reviewers	Projects Reviewed	Hours Average Turnaround	Average Reviewer Rating
Are hand-picked to provide detailed feedback on your project submissions.	Our reviewers have extensive experience in guiding learners through their course projects.	You can resubmit your project on the same day for additional feedback.	Our learners love the quality of the feedback they receive from our experienced reviewers.

Course 1: Cloud Fundamentals

The cloud has become a key enabler for innovation with beneficial features like high availability, unlimited capacity, and on-demand scalability and elasticity. Learn the fundamentals of cloud computing while beingintroduced to compute power, security, storage, networking, messaging, and management services in the cloud. While learning the fundamentals, you will explore tools and services offered by Amazon Web Services (AWS) through interactive hands-on exercises. By the end of the module, you will have deployed your first website to AWS.

Project	Deploy Static Website on AWS

The cloud is perfect for hosting static websites that only include HTML, CSS, and JavaScript files that require no server-side processing. In this project, you will deploy a static website to AWS. First, you will create a S3 bucket, configure the bucket for website hosting, and secure it using IAM policies. Next, you will upload the website files to your bucket and speed up content delivery using AWS's content distribution network service, CloudFron. Lastly, you will access your website in a browser using the unique S3 endpoint.

LESSON TITLE	LEARNING OUTCOMES
CLOUD OVERVIEW	• Learn the basics of cloud computing including cloud deployment models, benefits, and popular options and explore services provided by Amazon Web Services (AWS).
FOUNDATIONAL AND COMPUTE SERVICES	• Learn why we need servers, compute power, and security. • Explore AWS compute services like Elastic Cloud Compute (EC2), Virtual Private Cloud (VPC), Lambda for serverless framework, and Elastic Beanstalk in action. • Launch a secure EC2 instance, create and execute a Lambda, and deploy an application to Elastic Beanstalk.
STORAGE AND CONVENIENT DELIVERY	• This lesson will teach you why we need storage and content delivery in the cloud. • Discover and learn storage services like S3, DynamoDB, Relational Database Service (RDS), and CloudFront. • Create a DynamoDB table, launch a MySQL database instance, and create a CloudFront distribution.

Course 1: Cloud Fundamentals, cont.

LESSON TITLE	LEARNING OUTCOMES
SECURITY	· After this lesson you will understand the importance of security in the cloud. · You will also see Identity & Access Management (IAM) in action and secure applications using IAM users, groups, and policies.
NETWORKING & ELASTICITY	· Learn the basics of networking and elasticity in the cloud. · Examine services like Route 53, EC2 Auto Scaling, and Elastic Load Balancing and add an auto scaling policy to your EC2 instance.
MESSAGING & CONTAINERS	· Explore the basics of messaging and containers in the cloud. · Examine services like Simple Notification Service (SNS), Simple Queue Service (SQS), and Elastic Container Service (ECS), so you can create cloud notifications using SNS.
AWS MANAGEMENT	· Learn why we need logging, auditing, and resource management in the cloud and understand services like Cloud Watch, Cloud Trail, Cloud Formation, and the AWS Command Line Interface (CLI) which you will also explore.

Course 2: Deploy Infrastructure as Code (IAC)

With the advent of cloud computing, along came several tools that enabled us to deploy the underlying infrastructure components that provide security and services to our servers by writing scripts. In this course, you'll learn how to deploy this infrastructure using CloudFormation, AWS' tool for Infrastructure as Code. You will use CloudFormation to deploy Infrastructure patterns that are used in the industry broadly and can be readily used to deploy any cloud application. Like in the real world, you will begin with initial business requirements that you will turn into Cloud Architecture Diagrams. Then you will deploy this architecture using CloudFormation.

Project	Deploy a high-availability web app using CloudFormation

In this project, you'll deploy web servers for a highly available web app using CloudFormation. You will write the code that creates and deploys the infrastructure and application for Instagram-like app from the ground up. You will begin with deploying the networking components followed by servers, security roles and software. The procedure you follow here will become part of your portfolio of cloud projects. You'll do it exactly as it's done on the job: following best practices and scripting as much as possible.

LESSON TITLE	LEARNING OUTCOMES
GETTING STARTED WITH CLOUD FORMATION	· This lesson will help you set up the necessary tools to get started with cloud formation and deploy your first server using cloudformation.
INFRASTRUCTURE DIAGRAMS	· Convert business requirements into infrastructure diagrams and understand the principles behind the design choices.
NETWORKING INFRASTRUCTURE	· Learn how to implement virtual private network and subnets and learn how to provide inbound and outbound internet access to your public and private subnets inside your VPC. · Use routing table to route the traffic within our virtual private cloud.

Course 2: Full Stack Apps on AWS, cont.

LESSON TITLE	LEARNING OUTCOMES
SERVERS AND SECURITY GROUPS	· In this lesson you will learn how to deploy a web server into an autoscaling group and implement a load-balancer to increase the capacity of your app. · You will also discover how to implement security groups and understand the concept of least-privilege as it applies to network traffic.
STORAGE AND DATABASES	· Here you will deploy S3 storage for images configuration files etc., and deploy relational database and encryption services for your application.

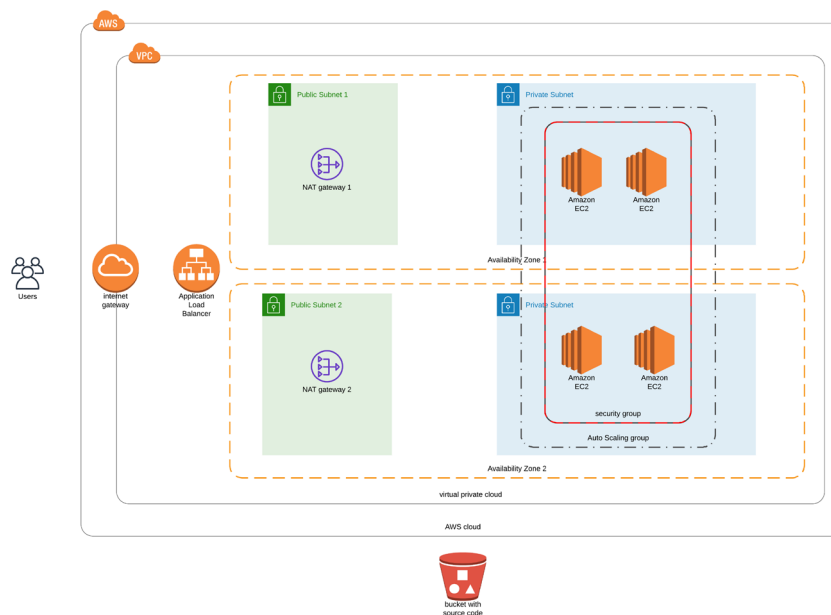**Project Example** — Deploy a high-availability web app using CloudFormation

Image from an actual learner-submitted course project.

Course 3: Build CI/CD Pipelines, Monitoring & Logging

In this course, you'll learn the process of taking software from source code to deployment and beyond. You'll learn about automated testing, choosing the right deployment strategy for your business needs and deploying an appropriate CI/CD pipeline. You'll also learn about monitoring and logging to ensure that your application running at peak performance and stays that way. You'll also learn to manage and make changes to your servers in an automated way, using Ansible, a leading Configuration Management tool.

Project	Build CI/CD Pipeline for Blue/Green Deployment

In this project, you will build on the skills acquired during this course. You will first create a pipeline that spins up three servers and uses Ansible to deploy an application on the servers. Once those servers are running, you will create another pipeline to confirm that servers were configured as expected. You'll then use the "Blue/Green" deployment strategy to deploy additional features to those servers.

LESSON TITLE	LEARNING OUTCOMES
CONFIGURATION MANAGEMENT WITH ANSIBLE	• Learn how to install software automatically with a tested and repeatable process that can be executed across your entire server fleet. • Then apply patches to your infrastructure without having to manage servers individually.
BUILD CI/CD PIPELINES WITH JENKINS ON AWS	• Understand how to select the appropriate deployment strategies to avoid downtime and create pipelines that include automated testing to ensure software packages are delivered with quality in mind. • Learn to identify and create pipelines for Development and Production.
LOGGING	• Explore how to use CloudWatch to aggregate logs and setup log agents to collect data directly from the source and send it to a centralized location for analysis.
MONITORING & ALARMS	• In this lesson you will identify and monitor meaningful metrics to setup alarms that will alert you of potential server issues. • Learn how to create dashboards to visualize your server metrics.

Course 4: Microservices at Scale using Kubernetes

In this module, you will learn to create and deploy a Kubernetes cluster, configure Kubernetes autoscale, and load test a Kubernetes application. You'll learn to operationalize both existing and new microservices and apply containers best practices. You'll learn to deploy Machine Learning microservices that are elastic and fault tolerant. You'll learn to pick the appropriate abstraction for microservices: Serverless (AWS Lambda) or Container Orchestration (Kubernetes).

Project	Operationalize a Machine Learning Microservice API

In this project, you will continue your work on operationalizing microservices by deploying an elastic and fault-tolerant Machine Learning inference API using Kubernetes. You'll configure this microservice to be highly available by using Kubernetes best practices. You will validate your design by load testing the service and verifying the application architecture performs as designed.

LESSON TITLE	LEARNING OUTCOMES
DEPLOY HIGH AVAILABILITY MICROSERVICE EVENT DRIVEN APPLICATION	· This first lesson will help you understand Serverless (AWS Lambda) concepts and understand which container abstraction to use: AWS Lambda or Kubernetes. · Then you will deploy producer/consumer AWS Lambda applications and configure cloudwatch events.
USE DOCKER FORMAT CONTAINERS	· In this lesson you will explore Docker image format and run and modify Docker containers locally. · After, deploy customized containers to Amazon ECR.
CONTAINERIZATION OF EXISTING APP	· Here you will learn to use the appropriate Docker base image. You will discover how to install packages into Docker image and copy application into Docker image. · After this lesson you will also be able to configure an application setup and start in Docker image.
OPERATIONALIZE & ORCHESTRATE	· This lesson will help you understand Kubernetes concepts. · You will configure monitoring, alerts and incidence responses and integrate CI/CD Pipeline and configure Autoscaling.

Project	Final Capstone Project

The purpose of the cloud development capstone project is to give you a chance to combine what you've learned throughout the program. This project will be an important part of your portfolio that will help you achieve your cloud development-related career goals. In the capstone project, each project is unique to the student. You'll build an application on AWS based on predefined criteria. Students will define the scope of the project, come up feature list and decide which AWS services to use to meet availability and performance criteria.

We could really use more project examples for this syllabus but I cannot find anymore...

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