



UDACITY
FOR ENTERPRISE

THE SCHOOL OF CLOUD COMPUTING

Cloud Developer

NANODEGREE SYLLABUS

Overview

Cloud Developer Nanodegree Degree

The Cloud Developer Nanodegree program is designed for learners to understand the fundamentals of cloud development and deployment with AWS. Then, using newfound skills, build different apps leveraging microservices, Kubernetes clusters and serverless application technology.

Cloud Developers design and develop secure cloud applications, services and products. This can include everything from back-end, front-end, web application, full-stack and cloud application deployment. You will develop cloud-native applications or migrate legacy applications to cloud. This role is a great fit for traditional software engineers and developers who want to build applications on cloud technologies.

In the program, you will:

- Build a static website using AWS.
- Develop and deploy cloud-native full-stack applications on AWS.
- Refactor monolithic apps to microservices, and scale using Kubernetes.
- Develop and deploy a serverless application using AWS Lambda.

Program Information



TIME

4 months
Study 10 hours/week



LEVEL

Practitioner



PREREQUISITES

Intermediate knowledge of JavaScript and familiarity with object-oriented programming. You should also be familiar with the use of Git and Github and know the Linux Command Line Basics.



HARDWARE/SOFTWARE REQUIRED

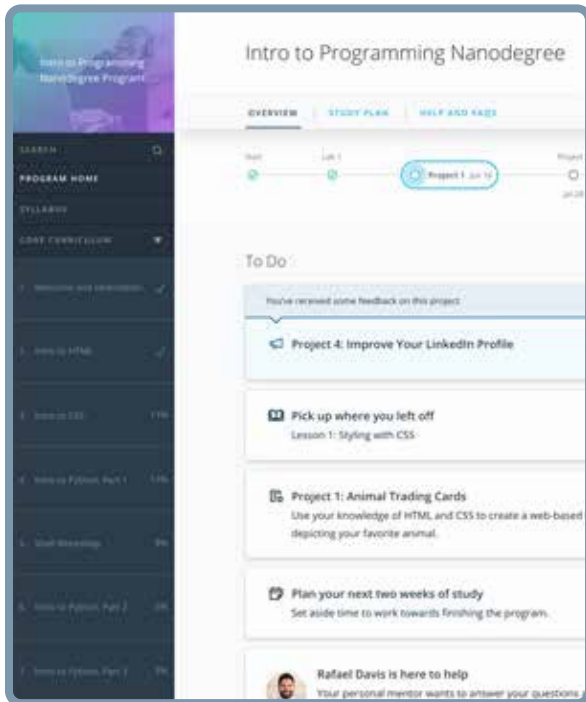
Access to the internet and a 64-bit computer.



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

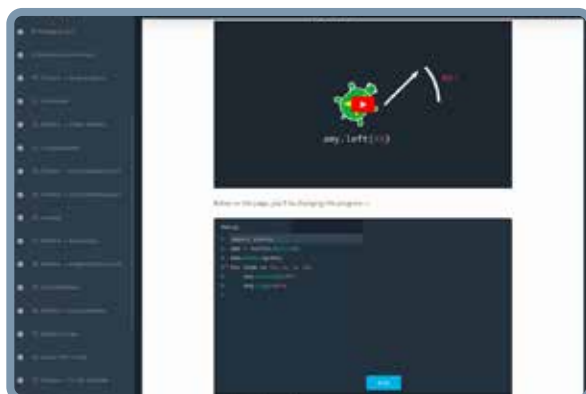
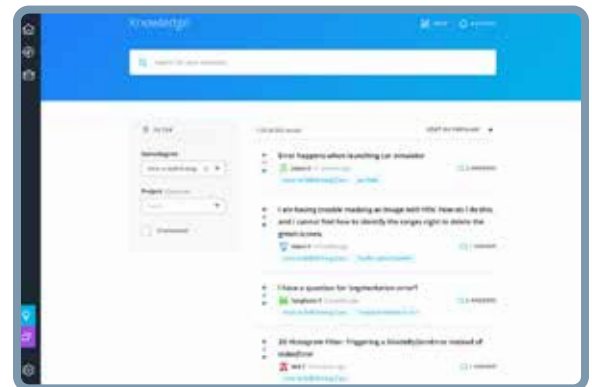
Learners leverage the power of community through a simple, yet powerful chat interface built within the classroom. Learner Hub connects learners with their technical mentor and fellow learners.

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



Keshia Williams

INSTRUCTOR

Keshia 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.



Gabriel Ruttner

INSTRUCTOR

Gabe is the CTO at Ursa & Tech Advisor for Start-Ups. Gabe has expertise in building cloud-based machine learning and natural language processing services at early stage tech companies. He holds technical degrees from Cornell University and Stony Brook University.



Justin Lee

INSTRUCTOR

Justin is an engineer specializing in designing modern data platforms and scalable systems. He has been a consultant for Fortune 500 companies and has traveled the world to work with his clients. He provides mentorship and interviews developers through Codementor and has a BS in Computer Science from UCLA.



Ivan Mushketyk

INSTRUCTOR

Ivan formerly worked at Amazon Web Services (AWS), where he built features for cloud services such as CloudWatch, and his professional experience includes cloud, networking and blockchain. Ivan is also a prolific Open Source contributor, blogger and online instructor.



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 being introduced 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, CloudFront. 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
- 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 CONTENT DELIVERY

- Learn why we need storage and content delivery in the cloud
- 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

Nanodegree Program Overview

Course 1: Cloud Fundamentals, cont.

LESSON TITLE	LEARNING OUTCOMES
SECURITY	<ul style="list-style-type: none">• Learn the importance of security in the cloud• See Identity & Access Management (IAM) in action• Secure applications using IAM users, groups and policies
NETWORKING & ELASTICITY	<ul style="list-style-type: none">• Learn the basics of networking and elasticity in the cloud• Examine services like Route 53, EC2 Auto Scaling and Elastic Load Balancing• Add an auto scaling policy to your EC2 instance
MESSAGING & CONTAINERS	<ul style="list-style-type: none">• Learn the basics of messaging and containers in the cloud• Explore services like Simple Notification Service (SNS), Simple Queue Service (SQS) and Elastic Container Service (ECS)• Create cloud notifications using SNS
AWS MANAGEMENT	<ul style="list-style-type: none">• Learn why we need logging, auditing and resource management in the cloud• Understand services like Cloud Watch, Cloud Trail, Cloud Formation and the AWS Command Line Interface (CLI)• Explore the CLI



Course 2: Full Stack Apps on AWS

Explore the foundational concepts of designing and deploying scalable, extendable and maintainable full stack applications using modern cloud architecture. All concepts are covered at a fundamental level and motivated with practical, real-world programming exercises. Through the course, you'll have built and deployed a multi-service cloud stack. By the end of this course, you'll understand key design decisions and useful tools to maintain your application.

Project

Udagram: Your Own Instagram on AWS

In this project, you will develop a cloud-based application for uploading, listing, and filtering images. You will use Node.js/Express, a popular javascript framework for networked application development to develop this application. You will implement a REST API to issue commands using HTTP, store data in Amazon Web Services Relational Data Service (RDS) and S3, extend the codebase with secure authentication signon features, and deploy to Amazon Web Services Elastic Beanstalk. These are the hard skills you'll need in any Cloud developer role.

LESSON TITLE	LEARNING OUTCOMES
CLOUD BASICS	<ul style="list-style-type: none">• Learn the key terminology and building blocks of a cloud system• Understand design paradigm of modern cloud applications
SET UP BEST PRACTICES	<ul style="list-style-type: none">• Implement a process so you write quality code, whether you're working alone or on teams• Learn unit and integration testing, a better way to Git, and how to use packaged dependencies
STORING DATA IN THE CLOUD	<ul style="list-style-type: none">• Set up and start using a cloud-based relational database for storing user data using AWS RDS• Implement a filestore for media like images using AWS S3
DEPLOYING TO THE CLOUD	<ul style="list-style-type: none">• Consume cloud data services (database and filestore) within your server application• Deploy your application using AWS Elastic Beanstalk

Nanodegree Program Overview

Course 2: Full Stack Apps on AWS, cont.

LESSON TITLE

LEARNING OUTCOMES

USER AUTHENTICATION AND SECURITY

- Learn common mistakes and modern techniques for dealing with security and new set of cloud authentication challenges

SCALING AND FIXING

- Cloud systems need to be maintained as dependencies are updated and there is more demand for your service—explore tools and process to minimize growing pains.





Course 3: Monolith to Microservices at Scale

Microservices are becoming the default mode of developing and deploying applications at scale. The microservices architecture makes it easier to scale an application to a large system and is a great enabler for continuous integration and delivery. Microservices architecture allows independent scaling, independent releases and deployments and independent development so that each service has its own codebase. In this course we will cover the best practices on how to develop and deploy microservices. You will learn topics such as different microservice architecture patterns, independent scaling, resiliency, securing microservices and best practices for monitoring and logging. By the end of this course, you should be able to design and build an application using a microservice architecture.

Project

Refactor Monolith to Microservices and Deploy

In this project, you will take an existing application named Udagram and refactor it into a microservice architecture with lean services. You will build out a CI/CD process that automatically builds and deploys Docker images to a Kubernetes cluster. The Kubernetes cluster will be configured to help solve common challenges related to scale and security.

LESSON TITLE

LEARNING OUTCOMES

MICROSERVICES DESIGN PRINCIPLES AND BEST PRACTICES

- Learn different microservices architecture designs and how to divide an application into microservices

CONTAINERS USING DOCKER

- Build and run your first container image using Docker
- Debug container and store these images using container registry

AUTOMATING THE APPLICATION DEVELOPMENT LIFECYCLE

- Understand CI/CD benefits and use Travis to build CI/CD pipeline
- Integrate github and CI/CD and automate testing with CI

Nanodegree Program Overview

Course 3: Monolith to Microservices at Scale, cont.

LESSON TITLE	LEARNING OUTCOMES
ORCHESTRATION WITH KUBERNETES	<ul style="list-style-type: none">• Learn the fundamentals of Kubernetes• Configure and launch an auto-scaling, self-healing Kubernetes cluster• Deploy your microservices using Kubernetes cluster
BEST PRACTICES AND DESIGN PATTERNS FOR KUBERNETES IN PRODUCTION	<ul style="list-style-type: none">• Implement service registration and discovery• Configure scaling and self-healing• Secure microservices• Implement monitoring and logging for microservices deployment• Improve resilience and availability into cloud applications





Course 4: Develop & Deploy Serverless App

Serverless technologies have become very popular recently because they can increase the speed of development and drastically reduce the cost of running a cloud infrastructure. This course combines the theory of using serverless technologies with the practice of developing a complex serverless application. You will learn advanced serverless features such as implementing WebSockets and stream processing, and learn about serverless best practices throughout the course.

Project

Serverless Application

In this project you will develop an Instagram-like serverless service for uploading, listing, and filtering images. You will begin with building serverless REST APIs using API Gateway and AWS Lambda, a stack of serverless technologies on AWS. You will then implement an API to interact with this application, store data in AWS DynamoDB, S3 and Elasticsearch secure your application with authentication; and deploy to Amazon Web Services using a Serverless framework.

LESSON TITLE

LEARNING OUTCOMES

INTRODUCTION TO SERVERLESS

- Learn the main components of a serverless application
- Implement simple application using Function as a Service (FaaS)

REST APIs FOR SERVERLESS

- Build a simple REST API using serverless technologies such as API Gateway, AWS Lambda and AWS DynamoDB and use it in React based web application

SERVERLESS FRAMEWORK

- Build, package and deploy serverless applications using Serverless framework
- Implement additional features using advanced DynamoDB features

Nanodegree Program Overview

Course 4: Develop & Deploy Serverless App, cont.

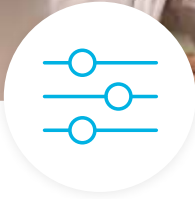
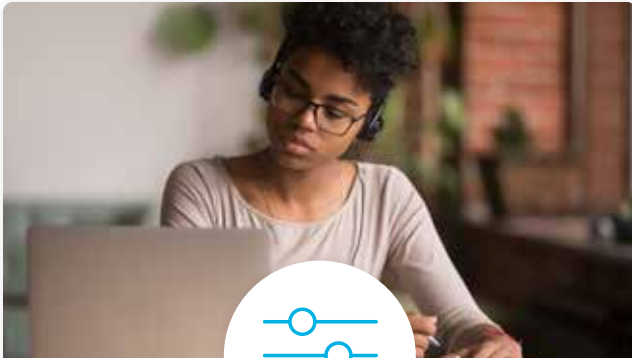
LESSON TITLE	LEARNING OUTCOMES
EVENTS PROCESSING WITH SERVERLESS	<ul style="list-style-type: none">• Improve our application using FaaS ability to execute custom logic when particular events occur in the system• Add WebSockets support and full-text search to your app
IMPLEMENTING AUTHENTICATION	<ul style="list-style-type: none">• Implement authentication in a serverless application using popular serverless service Auth0 in your app API and client application• Learn to store secrets for our serverless application using AWS Secrets Manager
SERVERLESS BEST PRACTICES	<ul style="list-style-type: none">• Learn how to test serverless applications, minimize risk of vendor lock-in, create multiple stages of our API and improve security and observability of our application

Project

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.

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.


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.



Expert Project Reviewers
Are hand-picked to provide detailed feedback on your project submissions.



Projects Reviewed
Our reviewers have extensive experience in guiding learners through their course projects.



Hours Average Turnaround
You can resubmit your project on the same day for additional feedback.



Average Reviewer Rating
Our learners love the quality of the feedback they receive from our experienced reviewers.



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



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