THE SCHOOL OF CLOUD COMPUTING

Cloud DevOps using Microsoft Azure

Cloud DevOps using Microsoft Azure Nanodegree Program

THIS NANODEGREE PROGRAM IS CRATED IN COLLABORATION WITH

Microsoft

Microsoft Azure is one of the most popular cloud services platforms used by enterprises, making it a crucial tool for cloud computing professionals to add to their skillset.

The Cloud DevOps using Microsoft Azure Nanodegree program teaches students how to deploy, test, and monitor cloud applications on Azure, thereby preparing learners for success on Microsoft's AZ-400 DevOps Engineer Expert certification exam.

Program Information

TIME
3 months
Study 10 hours/week

LEVEL
Practitioner

PREREQUISITES
- Write and read code using Python with 1 or more years of experience, including knowledge of loops, if/ then statements, data types, functions, classes, and objects
- Create a free-tier Azure account for this course, which requires a computer with command-line access, an up-to-date Web browser, and an email address
- Demonstrate conceptual cloud skills:
- Identify core components of the cloud (e.g. Virtual Machines, Virtual Networks, Databases) and
- their function in the context of one of the major cloud providers. (i.e. Azure, AWS, GCP)
- Provision a cloud development environment and do high-level systems administration tasks
- Demonstrate basic Linux shell skills.

HARDWARE/SOFTWARE REQUIRED
A computer running recent versions of Windows, Mac OS X, or Linux and an unmetered broadband Internet connection. You'll also need a free or existing Azure account in order to create and provision Azure services.

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

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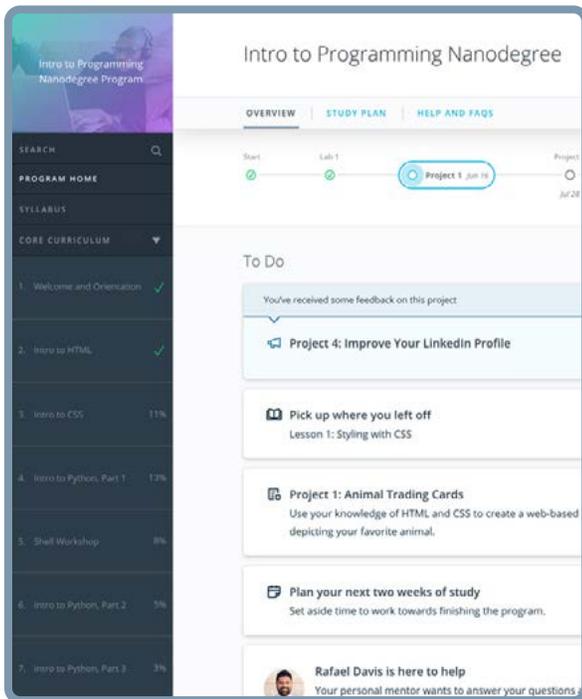
REAL-WORLD PROJECTS
Learners build new skills through industry-relevant projects and receive personalized feedback from our network of 900+ project reviewers. Our simple user interface makes it easy to submit projects as often as needed and receive unlimited feedback.

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.

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
Create a custom study plan to suit your personal needs and use this plan to keep track of your progress toward your goal.
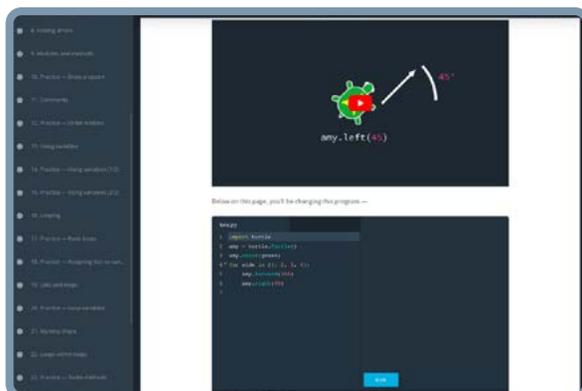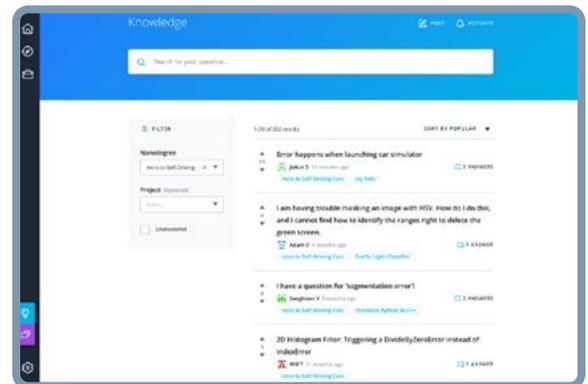
PROGRESS TRACKER
Personalized milestone reminders help learners stay on track and focused as they work to complete their Nanodegree program.

Learn with the Best

Noah Gift

FOUNDER OF PRAGMATIC AI LAB

Noah Gift teaches and consults at top universities and companies globally, including Duke and Northwestern. His areas of expertise are machine learning, MLOps, A.I., Data Science, Machine Learning, and Cloud Architecture. Noah has authored several bestselling books, including Python for DevOps.

Erick Galinkin

PRINCIPAL AI RESEARCHER AT RAPID7

Erick Galinkin is a hacker and scientist specializing in Applying Artificial Intelligence to Cybersecurity problems and the Theory of Machine Learning. He is also a researcher at the Montreal AI Ethics Institute focusing on applying DevOps principles to the security and ethics of machine learning systems.

Nathan Anderson

DEVOPS ENGINEER, GOODYEAR TIRE & RUBBER COMPANY

Nathan has worked on implementing DevOps solutions for the past 8 years across the financial, educational, logistics, and manufacturing industries.

Course 1: Azure Infrastructure Operations

In modern deployments, automated deployment and management of cloud infrastructure is crucial for ensuring the high uptimes that customers expect. Understand the DevOps lifecycle and the basics of infrastructure management in Microsoft Azure. Learn about cloud security best practices to keep infrastructure secure. Leverage modern technologies to create robust and repeatable deployments in Microsoft Azure.

Project	Deploying a Web Server in Azure

One of the most common objects on the modern internet is the load-balanced web server. In this project, you will write infrastructure as code using Terraform and Packer to manage cloud infrastructure. With these infrastructure as code tools, you will first create a policy that ensures all indexed resources are tagged. Then, you will create a reusable Terraform module and Packer template for deploying a custom web server image. Lastly, you'll use Packer to deploy your VM image and use Terraform to write the infrastructure configuration which uses this image to create a set of load balanced web servers.

LESSON TITLE	LEARNING OUTCOMES
INTRODUCTION TO DEVOPS & INFRASTRUCTURE	· Identify the motivation and benefits of using a DevOps model. · Identify stakeholders for your work. · Create documentation to enable reusability of work.
AZURE INFRASTRUCTURE FUNDAMENTALS	· Create and manage resources in Microsoft Azure using the portal and the Command Line Interface. · Optimize virtual machine performance using Azure Monitor. · Assign and manage user roles in Azure Active Directory.
AZURE SECURITY BEST PRACTICES	· Identify security risks using Azure Security Center. · Manage Network Security groups to ensure secure infrastructure access. · Write, deploy, and manage Azure Policies.
INFRASTRUCTURE AS CODE	· Deploy infrastructure as code using Terraform. · Use variables, loops, and conditionals to improve deployment automation. · Create reusable virtual machine images with Packer.

Course 2: Agile Development with Azure

Automated Deployment of high quality software using DevOps principles is a critical skill in the cloud era. Master the theory and practice of Agile Project management with hands-on examples. Execute a Python centric Continuous Integration strategy that uses testing best practices, including open source code quality tools such as pylint and pytest. Couple Infrastructure-as-Code (IaC) with Continuous Delivery using Azure Pipelines to streamline the deployment of applications to Azure.

Project	Building a CI/CD Pipeline

Establishing a Continuous Integration/Continuous Delivery (CI/ CD) pipeline is critical to enable high-quality customer service experiences in today's digital world. In this project, you will build a Continuous Delivery pipeline that deploys a Flask Machine Learning application using Azure Pipelines to Azure App Services. First, you'll use Github Actions along with a .txt file and application code to perform an initial lint, test, and install cycle on a machine learning application running in Flask in Azure App Services. Then, you'll integrate Continuous Delivery using Azure Pipelines to deploy tested application changes automatically to production. Finally, you'll test the prediction capability of your machine learning application deployed into production and build a demo screencast that demonstrates your proficiency in Continuous Delivery with Azure.

LESSON TITLE	LEARNING OUTCOMES
INTRODUCTION TO AGILE DEVELOPMENT WITH AZURE	· Use modern Agile project management methodologies. · Implement Kaizen, or continuous improvement in their organization. · Understand how to use five why's methodological to perform root cause analysis of process inefficiencies.
AGILE PLANNING AND COMMUNICATION	· Use Trello and Spreadsheets to manage projects. · Build and participate in effective technical teams. · Use weekly demos to create effective technical communication and accountability.
CONTINUOUS INTEGRATION	· Build continuous integration using Github Actions. · Master the use of Makefiles for automation. · Use pylint and pytest to increase the quality of Python projects.
CONTINUOUS DELIVERY	· Build continuous delivery pipelines using Azure Pipelines. · Use Azure App Services to deploy PaaS (Platform as a Service) applications. · Understand the concepts involving GitOps in production systems.

Course 3: Ensuring Quality Releases (Quality Assurance)

Applications that have been built and released into the cloud need to be evaluated to ensure proper performance. Test cloud-based application performance and functionality within the pipeline itself, as well as after it has been deployed by using different types of test suites such as Selenium and Postman. Exercise those test suites against a variety of endpoints, including a sample eCommerce UI, and REST APIs. Build a systemic application monitoring process based on alert triggers in Azure Monitor and custom log files in Azure Log Analytics.

Project	Ensuring Quality Releases

In order to ensure optimal performance and functionality, cloud applications must undergo continual testing and monitoring. In this project, you will use industry leading DevOps tools within Microsoft Azure and Terraform to create disposable test environments within a CI/CD pipeline and run a variety of automated tests with the click of a button. First, you'll deploy an application to a test environment that automatically executes load, integration, and functional tests. Then you'll view the ingested logs and data from these tests to determine where failures may have occurred. Finally, you'll determine root causes by querying the application's custom log files.

LESSON TITLE	LEARNING OUTCOMES
CREATING AND DEPLOYING AZURE CLOUD INFRASTRUCTURE	• Use terraform and IaC concepts to standardize the creation and configuration of a test environment. • Understand the importance of consistent test environments so that the only thing to change is the version of the application. • Use a CI/CD pipeline to execute automated testing tasks to test an application after its built and after its deployed to a test environment.
PERFORMANCE TESTING	• Learn about the different types of performance testing. • Use Apache JMeter to create performance test suites. • Understand when to use each type of performance test. • Generate a report which shows the results of the performance tests.

Course 3: Ensuring Quality Releases (Quality Assurance), cont.

LESSON TITLE	LEARNING OUTCOMES
FUNCTIONAL UI TESTING WITH SELENIUM	· Learn about how functional testing is different than other types of testing. · Use selenium to create functional UI tests. · Quickly find and use CSS Selectors on a page in a functional test. · Understand the importance of creating strong test cases in Selenium.
INTEGRATION TESTING WITH POSTMAN	· Learn about integration testing and when it is used. · Use Postman to create an integration test suite. · Understand the importance of data validation and the benefits it provides to stakeholders.
AZURE OBSERVABILITY	· Used Azure Monitor to create alerts. · Learned about creating only alerts that you trust. · Used Azure Log Analytics to ingest a custom log file. · Created queries in Azure Log Analytics so the root cause of a failure may be found quickly.

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.

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