



NANODEGREE PROGRAM SYLLABUS

Cloud DevOps using Microsoft Azure



Overview

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.

Prerequisites:

- Intermediate Python
- Intermediate Linux
- Intermediate Shell Scripting
- Experience using web services & web sites
- Basic familiarity with CI/CD pipelines
- Basic knowledge of IT Infrastructure

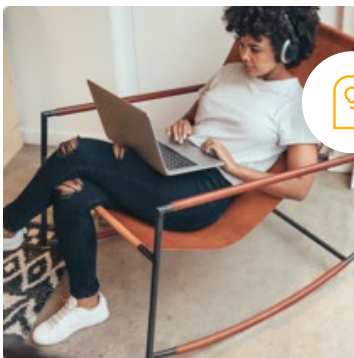
IN COLLABORATION WITH



Estimated Time:
3 Months at
5-10hrs/week



Prerequisites:
Intermediate
Python, Linux,
shell scripting



Flexible Learning:
Self-paced, so
you can learn on
the schedule that
works best for you



Need Help?
udacity.com/advisor
Discuss this program
with an enrollment
advisor.

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.

Course 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.

LEARNING OUTCOMES

LESSON ONE

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

LESSON TWO

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

LESSON THREE

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

LESSON FOUR

HTML Basics

- 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.

Course 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.

LEARNING OUTCOMES

LESSON ONE

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

LESSON TWO

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

LESSON THREE

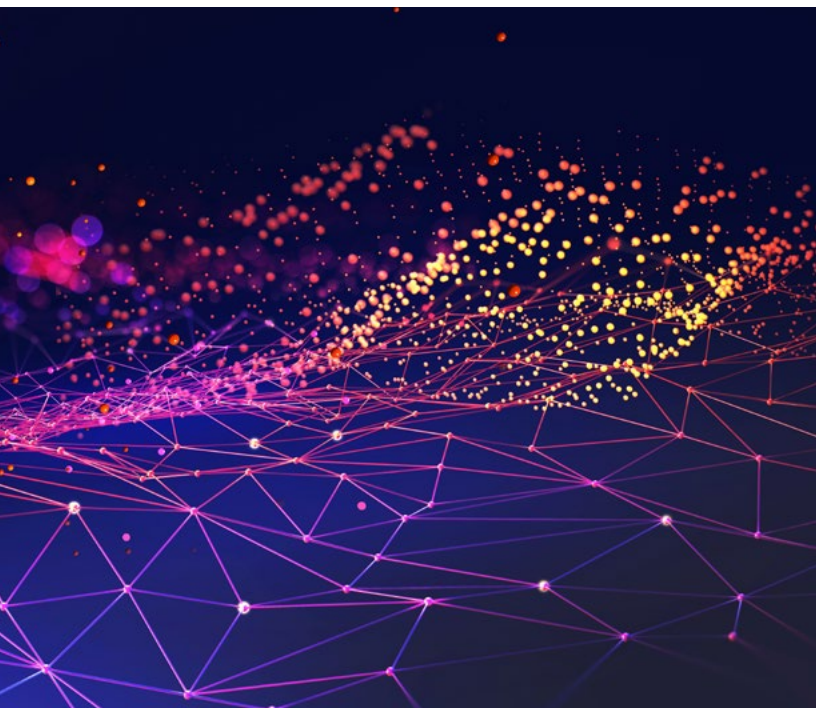
Continuous Integration

- Build continuous integration using Github Actions
- Master the use of Makefiles for automation
- Use pylint and pytest to increase the quality of Python projects

LESSON FOUR

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)

This course focuses on the Continuous Testing and Monitoring segments of the DevOps lifecycle. In the previous courses, you learned about what it takes to build and release an application using an Azure DevOps CI/CD pipeline. Now it's time to test the application within the pipeline itself, as well as after it has been deployed. Doing so will provide valuable insights into the health – not only of the application, but also the underlying infrastructure which supports it.

Course Project : Ensuring Quality Releases

In this project, you will use industry leading DevOps tools within Microsoft Azure to create disposable test environments and run a variety of automated tests with the click of a button. Additionally, you'll monitor and provide insight into your application's behavior, and determine root causes by querying the application's custom log files. By the end of this project, you will have built a CI/CD pipeline capable of creating a test environment using Terraform, deployed an application to the test environment, automatically executed load, integration, and functional tests, and ingested logs and data from those tests to determine where failures may have occurred.

LEARNING OUTCOMES

LESSON ONE

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.

LESSON TWO

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

LESSON THREE

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

LESSON FOUR

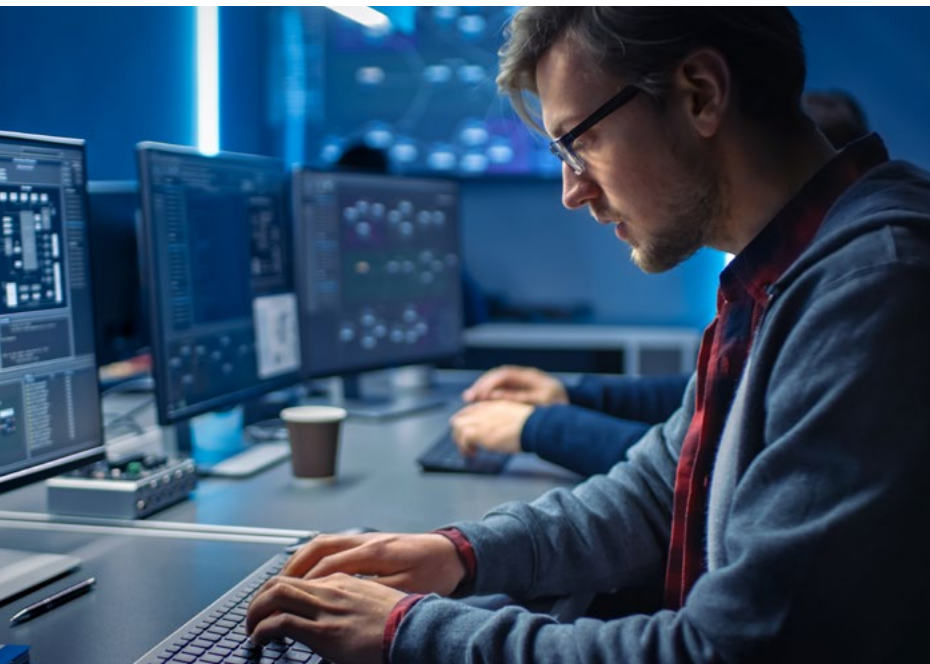
Integration Testing with Postman

- 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

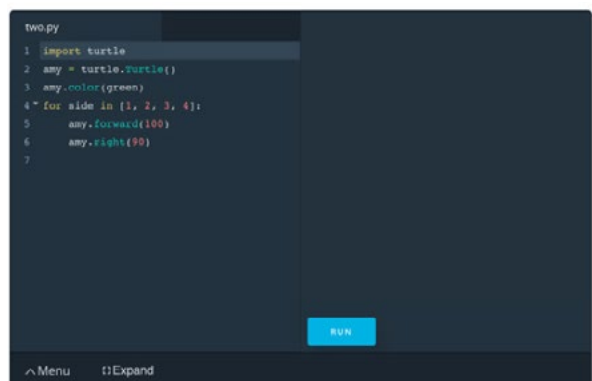
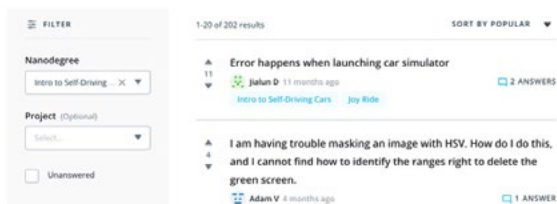
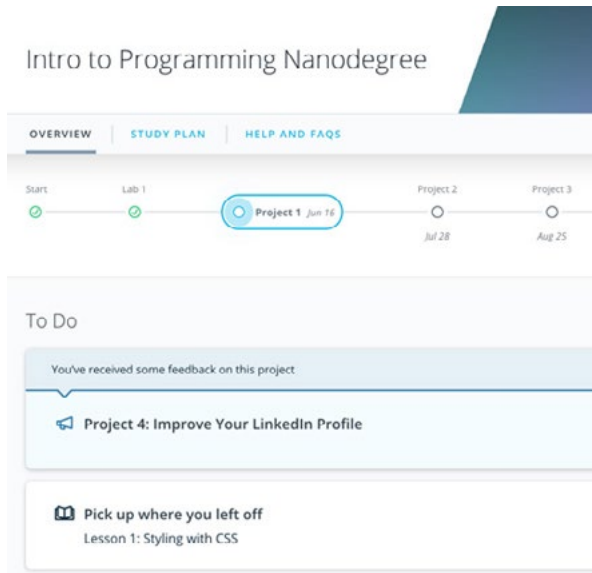
LESSON FIVE

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 Classroom Experience



REAL-WORLD PROJECTS

Build your skills through industry-relevant projects. Get personalized feedback from our network of 900+ project reviewers. Our simple interface makes it easy to submit your projects as often as you need and receive unlimited feedback on your work.

KNOWLEDGE

Find answers to your questions with Knowledge, our proprietary wiki. Search questions asked by other students, connect with technical mentors, and discover in real-time how to solve the challenges that you encounter.

STUDENT HUB

Leverage the power of community through a simple, yet powerful chat interface built within the classroom. Use Student Hub to connect with fellow students in your program as you support and learn from each other.

WORKSPACES

See your code in action. Check the output and quality of your code by running them on workspaces that are a part of our classroom.

QUIZZES

Check your understanding of concepts learned in the program by answering simple and auto-graded quizzes. Easily go back to the lessons to brush up on concepts anytime you get an answer wrong.

CUSTOM STUDY PLANS

Preschedule your study times and save them to your personal calendar to create a custom study plan. Program regular reminders to keep track of your progress toward your goals and completion of your program.

PROGRESS TRACKER

Stay on track to complete your Nanodegree program with useful milestone reminders.

Learn with the Best



Noah Gift

FOUNVDER 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. He also conducts academic research on machine learning theory and the interplay between algorithmic game theory and information security.



Nathan Anderson

DEVOPS ENGINEER
AT GOODYEAR TIRE & RUBBER COMPANY

Implemented DevOps solutions for the past 8 years across the financial, educational, logistics, and manufacturing industries

All Our Nanodegree Programs Include:



EXPERIENCED PROJECT REVIEWERS

REVIEWER SERVICES

- Personalized feedback & line by line code reviews
- 1600+ Reviewers with a 4.85/5 average rating
- 3 hour average project review turnaround time
- Unlimited submissions and feedback loops
- Practical tips and industry best practices
- Additional suggested resources to improve



TECHNICAL MENTOR SUPPORT

MENTORSHIP SERVICES

- Questions answered quickly by our team of technical mentors
- 1000+ Mentors with a 4.7/5 average rating
- Support for all your technical questions



PERSONAL CAREER SERVICES

CAREER SUPPORT

- Resume support
- Github portfolio review
- LinkedIn profile optimization

Frequently Asked Questions

PROGRAM OVERVIEW

WHY SHOULD I ENROLL?

Microsoft Azure is one of the fastest growing cloud service providers around, with 95% of Fortune 500 companies trusting the platform with their business. That's why companies across industries are looking to hire developers with Azure expertise, as Azure-related job growth is projected to hit almost 40% over the next decade. With Udacity's Cloud DevOps using Microsoft Azure Nanodegree program, you will learn the skills you need to be in demand, and you'll be prepared to take the **Microsoft AZ-400 Certification exam**, proving your proficiency at designing and implementing Microsoft DevOps Solutions.

WHAT JOBS WILL THIS PROGRAM PREPARE ME FOR?

Companies are hiring professionals with Azure skills for roles such as Systems Architect, Security Engineer, Database Architect, Network Architect, SysAdmin, Cyber Analyst, Database Admin, Software Engineer, and more.

HOW DO I KNOW IF THIS PROGRAM IS RIGHT FOR ME?

If you're a developer, system admin, or operations manager interested in automating IT infrastructure, building software delivery pipelines, and deploying and managing infrastructure, this program is for you. This program will enable you to gain the skills necessary to succeed in this rapidly-growing field.

ENROLLMENT AND ADMISSION

DO I NEED TO APPLY? WHAT ARE THE ADMISSION CRITERIA?

There is no application. This Nanodegree program accepts everyone, regardless of experience and specific background.

WHAT ARE THE PREREQUISITES FOR ENROLLMENT?

Students who are well-prepared to succeed in this program will have the following skills/prerequisites:

- Intermediate Python
- Intermediate Linux
- Intermediate Shell Scripting
- Experience using web services & web sites
- Basic familiarity with CI/CD pipelines
- Basic knowledge of IT Infrastructure

IF I DO NOT MEET THE REQUIREMENTS TO ENROLL, WHAT SHOULD I DO?

Udacity's **Intro to Cloud Computing** course is a great way to brush up on foundational Cloud concepts. We also have this **Intro to Python Programming** course, and the **Linux Command Line Basics** course if you'd like to learn more about the Linux OS.



FAQs Continued

TUITION AND TERM OF PROGRAM

HOW IS THIS NANODEGREE PROGRAM STRUCTURED?

The Cloud DevOps using Microsoft Azure Nanodegree program is comprised of content and curriculum to support three projects. Once you subscribe to a Nanodegree program, you will have access to the content and services for the length of time specified by your subscription. We estimate that students can complete the program in three months, working 5-10 hours per week.

Each project will be reviewed by the Udacity reviewer network. Feedback will be provided and if you do not pass the project, you will be asked to resubmit the project until it passes.

HOW LONG IS THIS NANODEGREE PROGRAM?

Access to this Nanodegree program runs for the length of time specified in the payment card above. If you do not graduate within that time period, you will continue learning with month to month payments. See the [Terms of Use](#) and [FAQs](#) for other policies regarding the terms of access to our Nanodegree programs.

SOFTWARE AND HARDWARE

WHAT HARDWARE, SOFTWARE, AND VERSIONS WILL I NEED IN THIS PROGRAM?

For this Nanodegree program, you will need a desktop or laptop computer running recent versions of Windows, Mac OS X, or Linux and an unmetered broadband Internet connection.

