UDACITY
FOR ENTERPRISE

THE SCHOOL OF PROGRAMMING AND DEVELOPMENT

Blockchain Developer

NANODEGREE SYLLABUS

Overview

Blockchain Developer Nanodegree Program

Learn the fundamentals of blockchain technology, create your own private blockchain, and learn the basics of bitcoin platform and how to secure a digital asset using blockchain identity.

Learners gain a deeper understanding of Ethereum platform, and use Solidity to develop, test and deploy your own decentralized app.

Continue to build on your blockchain skills with advanced topics such as privacy, security, payments, and oracles on blockchain.

Architect and build complex systems on blockchain for different use cases such as supply chain tracking, insurance payments and decentralized marketplace.

Program Information

TIME
4 months
Study 10 hours/week

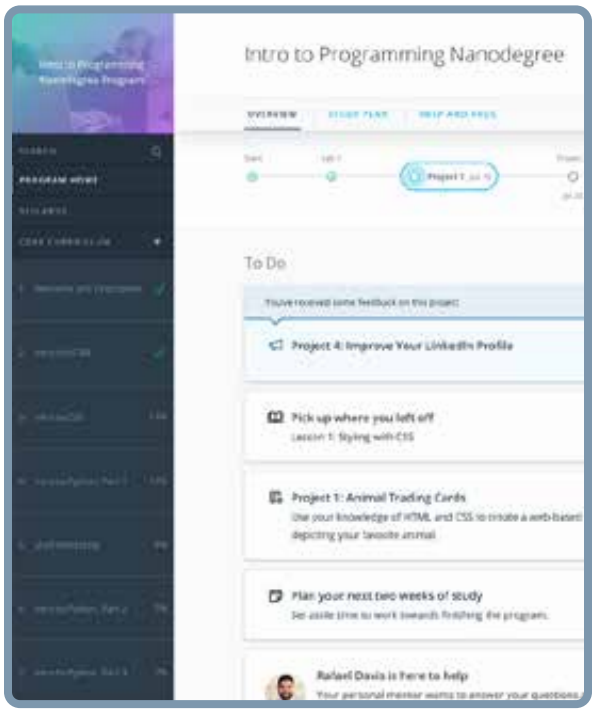
LEVEL
Specialist

PREREQUISITES
Ability to code with object-oriented programming, work with asynchronous JavaScript code, develop the front end and back end of a web application with JavaScript and create and consume data using a remote API.

HARDWARE/SOFTWARE REQUIRED
A computer running recent versions of Windows, Mac OS X, or Linux. 20+ gigabytes of free disk space, 2+ gigabytes of memory (RAM), and an unmetered broadband Internet connection.

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

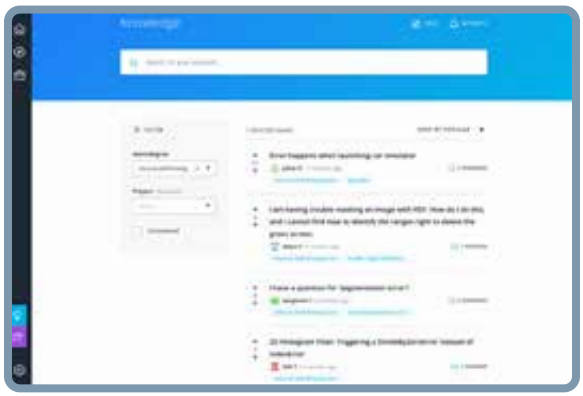
Learners leverage the power of community through a simple, yet powerful chat interface built within the classroom. Learner Hub connects learners with their technical mentor and fellow learners.

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

Brandy Camacho

CURRICULUM LEAD

Brandy is Curriculum Lead for the Blockchain Developer Nanodegree program. She was previously a Lead Technical Project Manager for Udacity. She is the founder of Network Designs, specializing in architecting software solutions.

Jessica Lin

INSTRUCTOR

Jessica holds a Biomedical Engineering degree from Cornell University. Prior to joining Udacity, she developed and deployed enterprise healthcare technologies. She has recently taught Android Development in our Nanodegree programs.

Joe Nyzio

INSTRUCTOR

Joe Nyzio earned his degree in Neuroscience from Temple University. At Udacity, he's been a Content Developer on the Data Analyst, Tech Entrepreneur, and Business Analyst Nanodegree programs.

Rachna Ralhan

INSTRUCTOR

Rachna holds a Bachelor's of Electrical Engineering and a Master's of Software Management. She brings years of software and hardware engineering experience and has previously worked for companies such as Intel, AMD, Cypress, and Xilinx Semiconductors.

Learn with the Best

PK Rasam

INSTRUCTOR

PK Rasam is Founder and Chief Blockchain Officer at LINCD, specializing in blockchain strategy and distributed ledger infrastructure services. PK's focus is on creating the next breed of Crypto Machine Intelligence-based businesses.

Nik Kalyani

INSTRUCTOR

Nik Kalyani is an entrepreneur and blockchain architect. He is the co-founder and CTO of WhenHub, creator of the Interface micro-contracts dApp. A Microsoft MVP, he is also the founder of TryCrypto and Walkstarter.

Elena Nadolinski

INSTRUCTOR

Elena Nadolinski is currently heads down building a new privacy cryptocurrency. Previously she was a Software Engineer at Airbnb, Tilt and Microsoft. Elena graduated with a degree in Computer Science from Virginia Tech in 2014.

Course 1: Blockchain Fundamentals

Learn the basics of how the blockchain data model works by creating your own private blockchain using Node.js and Leveldb.

Project: Create Your Own Private Blockchain

A blockchain is a shared database that features added immutability as a safe and accurate alternative to existing data storage methods. You'll learn the basics of how the blockchain data model works by creating your own private blockchain using Node.js and Leveldb.

In this project, you'll learn the fundamentals of architecting a collection of data into a blockchain data model. You'll configure how each block stores data, validate blocks, add new blocks to the chain, and create methods to validate the chain integrity.

You'll then create a back-end API web service, and migrate your private blockchain to the web service. In the process, you'll learn how to post new blocks to the blockchain via a RESTful web client. You'll then encrypt and decrypt the unique digital collectibles on a private blockchain.

LESSON TITLE	LEARNING OUTCOMES
BLOCKCHAIN BASICS	• Explain core components that make a blockchain secure and powerful. • Define blockchain protocols and their key differences.
MANAGING BLOCKCHAIN TRANSACTIONS	• Create and manage identity on the Bitcoin Blockchain and establish proof-of-ownership with blockchain transactions, without the need to provide sensitive information.
BITCOIN CORE TESTNET	• Explain the benefits of utilizing the Bitcoin Core testnet. • Describe the difference between the public testnet and regression testing.

Course 1: Blockchain Fundamentals, cont.

LESSON TITLE	LEARNING OUTCOMES
BLOCKCHAIN DATA	• Learn the relationship between different stages of transaction lifecycle using Bitcoin Core.
PRIVATE BLOCKCHAINS	• Explain the value of a private blockchain, and prepare for the course project.
DIGITAL ASSETS ON BLOCKCHAIN	• Encode and decode digital assets on a private blockchain, and publicly prove ownership of the assets using digital identity.

Course 2: Ethereum Smart Contracts, Tokens, and Dapps

Advance your blockchain skillset to the second generation of blockchain services with smart contracts utilizing the Ethereum network.

Project Build CryptoStar Dapp on Ethereum

With Project 2, your focus moves from Bitcoin to Ethereum blockchain. You'll begin by building a decentralized app (Dapp) that allows you to create, sell, and transfer ownership of unique star token (CryptoStar) on the Ethereum blockchain using smart contracts and the non-fungible (ERC721) token standard. This service is designed to demonstrate how to claim and transfer ownership of unique digital asset (e.g. document, deed, agreement, media, etc.) on Ethereum blockchain.

You'll build the back-end infrastructure for the CryptoStar with a pre-developed front end. This will enable you to render the service on any modern web clients.

LESSON TITLE	LEARNING OUTCOMES
ETHEREUM FUNDAMENTALS AND DEVELOPMENT TOOLS	• Describe the fundamentals of Ethereum and how it is different from Bitcoin. • Build, compile, deploy, and test smart contracts using remix, ganache, truffle, and infura.
SMART CONTRACTS WITH SOLIDITY	• Learn Solidity, a Turing complete smart contract language. • Learn about different token standards (ERC-721, ERC-20). • Create a fungible (ERC-20) token on Ethereum using Solidity.
ETHEREUM APP	• Develop, test and deploy a fully-functioning Dapp that allows users to create, buy and sell unique stars.

Course 3: Blockchain Architecture

Learn blockchain architecture and advanced concepts such as privacy, security and decentralized file management.

Project

Ethereum Dapp for Tracking Items through Supply Chain

By the completion of the second course project, you'll have learned the importance of Proof of Existence, which is used to verify whether a digital asset is authentic and can be trusted. In this project, you'll scale up to architect a solution that verifies authenticity for a product when multiple actors are involved.

You'll build a supply chain system on Ethereum blockchain that allows users to verify the authenticity of an item as it passes through different hands. You will architect a Dapp (Decentralized Application) authenticity management system backed by the Ethereum platform. To do so, you'll scope out the needs of the various actors in the supply chain and create smart contracts that help track product origination and verify product authenticity. You'll then tie this all together with a simple front-end that allows users to manage the product life-cycle as the product moves through the supply chain.

LESSON TITLE	LEARNING OUTCOMES
PLANNING BLOCKCHAIN SOLUTIONS	• Learn the correct technology stack to layer services and provide software solutions. • Design supporting visuals with Unified Modeling Language (UML).
PRIVACY	• Implement several techniques to enhance privacy of blockchain such as merkle trees, zero-knowledge proofs.
SECURITY & MAINTENANCE	• Identify architecture security and maintenance risks.
DISTRIBUTED FILE SYSTEM	• Create your own website and Dapp on the new decentralized storage protocol.

Course 4: Dapps with Autonomous Smart Contracts and Oracles

Advance your blockchain skill set by developing a decentralized application (Dapp) that will perform actions based on external triggers, and handle payments.

Project: Flight Delay Insurance Dapp

In the real-world, many smart contracts perform actions based on external triggers. These triggers can be caused by our actions, or by data received from outside sources using what are known as "oracles." To make real-world decentralized applications, smart contracts need to respond autonomously to these triggers, thereby making these applications more interactive.

In this project, you'll build a decentralized application for a use case in which you have airlines that offer flight delay insurance, and passengers who carry this insurance, and who get paid in the event their flight is delayed. You'll build multiple smart contracts which are autonomously triggered by external sources, and which handle payments based on flight delay scenarios.

LESSON TITLE	LEARNING OUTCOMES
MULTIPARTY CONTROL AND PAYMENTS WITH SMART CONTRACTS	• Build Dapp with secure, multi-sig smart contracts that autonomously receive, transfer, and pay funds.
ORACLES	• Utilize third-party data sources to inform autonomous smart contracts.
HANDLING SMART CONTRACT PAYMENTS	• Create, and test, secure and cost-efficient smart contracts that handle, distribute, and test ETH payments to a smart contract.

Course 5: Capstone

For your capstone project, you'll use all the new skills you've acquired to build decentralized property listing application.

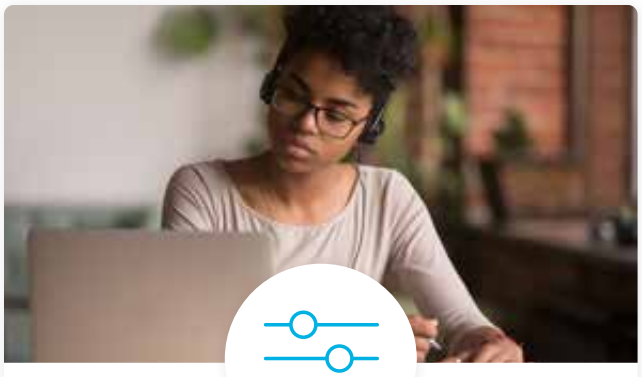
Project Capstone

Here, you'll use all the new skills you've acquired to build decentralized property listing application.

In this project, you will represent your ownership of the property using ZK-SNARKs and then mint tokens to represent your claim to the property. You will then make these tokens available for sale on blockchain marketplace.

LESSON TITLE	LEARNING OUTCOMES
ZK-SNARKS	• Learn how to implement ZK-SNARKs using Zokarates framework.

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+

Expert Project Reviewers

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

1.8M

Projects Reviewed

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

3

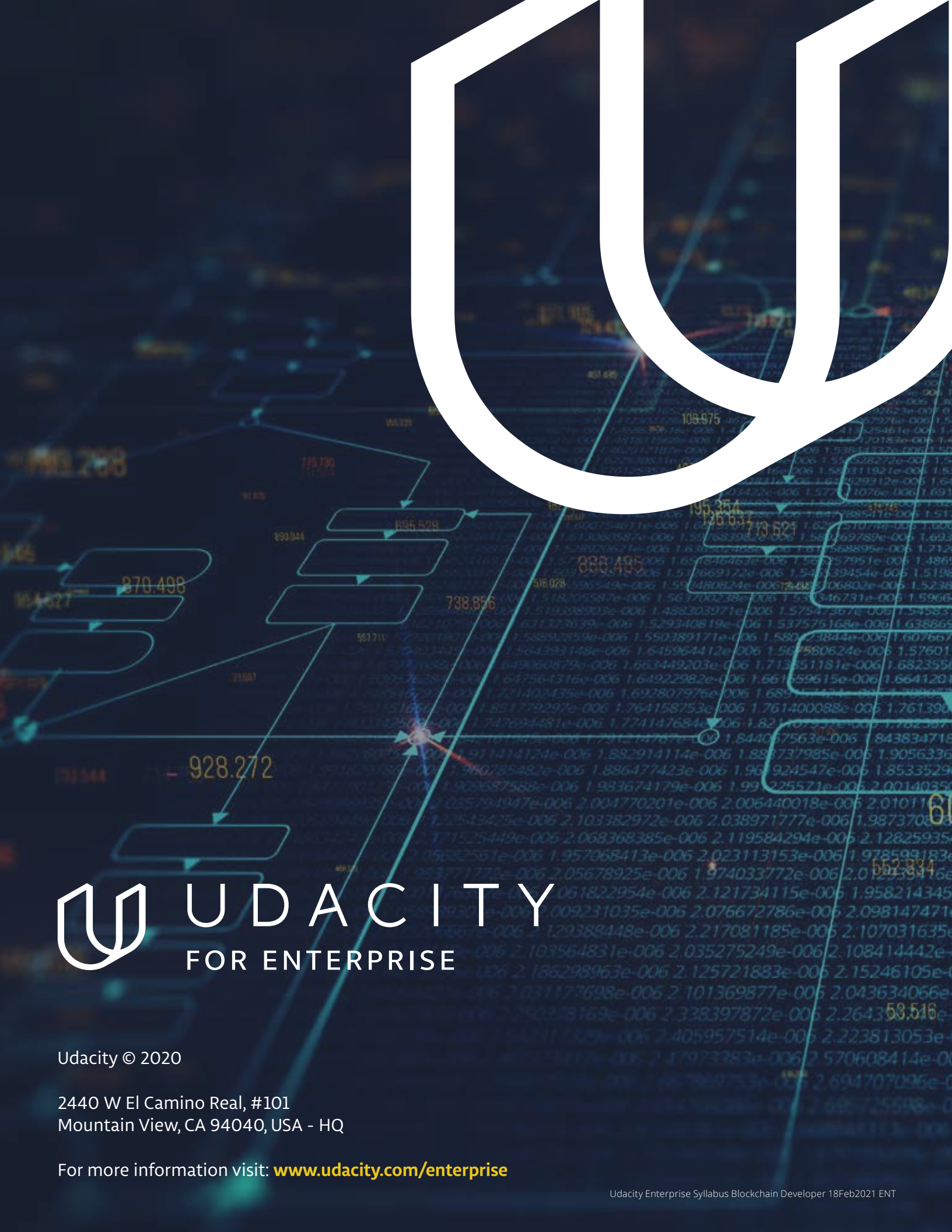
Hours Average Turnaround

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

4.85 /5

Average Reviewer Rating

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



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For more information visit: **www.udacity.com/enterprise**