

2023-2024

NWKTC Catalog and Student Handbook

Cloud-Crypto Computing

Description: The Cloud-Crypto Computing program offers five tracks to prepare students for entry into the exciting new field of cryptocurrency. After the first year of common core courses, students may choose from the Development/Operations Track; Back-end Track; Front-end Track; Product Design and Project Management Track; or the Blockchain Track.

Degree/Certificates awarded:

AAS
Tech Cert B

Program Learning Outcomes:

Upon successful completion of the program, the student will be able to:

Year 1

Semester 1

1. Code simple apps with Swift and obtain the Swift Explorations Certification.
2. Explain the structure of a Blockchain and how it works.
3. Implement a cryptocurrency wallet and use a faucet to fill it with test coins.
4. Build a node in a local test network.
5. Use Hash Algorithms, Public Key / Private Key Encryption, and Digital Signatures.
6. Design and implement Objects while following the SOLID principles.
7. Use common design patterns like singletons, factory, and facade.
8. Build an accessible web application using modern HTML, CSS and JavaScript.
9. Use GIT repositories (Push, Pull, Commit, Branch, and Merge).

Semester 2

in teams taking part in each of the roles listed below:

1. Lead a team for one project.
2. Work with a customer and design a prototype.
3. Build a frontend application.
4. Build a database and provide routes to add and remove data.
5. Design and build the coding pipeline for a project.
6. Build and deploy smart contracts on a test network.
7. Build Apps that interact with the smart contracts they have deployed to the test network.
8. Construct a Web Application using a major framework that implements retrieves data from a server.

Year 2

DevOps Track

1. Manage Developer Cloud Accounts and Resources

2. Build Code Pipelines with Continuous Integration / Continuous Deployment.
3. Obtain an AWS Certification (Minimum CCP)
4. Identify common security risks and explain the tools to monitor and stop them.
5. Maintain a GIT Repository and Rollback changes if needed.

Back-end Track

1. Design and Implement a Relational Database
2. Design and Implement a NoSQL Database
3. Implement a REST Server and interact with it.
4. Implement a GraphQL Server and interact with it.
5. Work with Microservices and Serverless functions.

Front-end Track

1. Build a responsive application that works with state changes.
2. Build an Android App with Kotlin
3. Fetch Data and Display in Web and Native Apps
4. Refactor an existing frontend to be more efficient.

Product Design and Project Management

1. Create and Design prototypes for multiple screen sizes and devices.
2. Explain key features of the HIG and Material documents.
3. Use Agile Methodology and Tools to manage a team.

Blockchain Track

1. Build, Test and Deploy smart contracts.
2. Explain Tokenomics and methods of making a cryptocurrency more or less valuable.
3. Create applications that interact with the smart contracts.

Program Schedule:

Students will attend class from 8:00 a.m. - 2:30 p.m., Monday through Friday.

Miscellaneous Notes:

The first year of study consists of the core courses that prepare students to choose one of five pathways for the second year of study. Students may choose ONE of the following: Back-end; Blockchain; Dev Ops; Front-end; Product Design and Project Management.

PROGRAM GUIDE

COMMON COURSES in FIRST YEAR

YEAR I: FIRST SEMESTER

Course #	Course Name	Credits
CCC 110	Object Oriented Programming	3
CCC 115	Programming in Swift	3
CCC 120	Front-end Web Development	3
CCC 125	Blockchain and Cryptocurrency Fundamentals	3
CF 101	Computer Fundamentals and Applications (Required)	3
MATH 120	Contemporary Math (Required)	3
SO 100	Student Success Seminar (Required)	1

YEAR I: SECOND SEMESTER		
Course #	Course Name	Credits
CCC 130	Software Design I	4
CCC 135	Design and Front-end Web Development	3
CCC 140	Advanced Programming in Swift	4
CCC 145	Cryptocurrency Smart Contracts	3
CCC 150	Distributed App Development	3
HUM 102	Workplace Ethics (or General Education Elective)	3

SECOND YEAR: Tracks

Back-end Track

YEAR II: FIRST SEMESTER		
Course #	Course Name	Credits
BA 215	Personal Finance (Required)	3
CBE 210	API Development	3
CBE 215	Microservices and Serverless	3
CBE 220	Database Management	3
CBE 225	Live Work I for Back-end	3
ENGL 106	Technical Writing-Coding Documentation	3

YEAR II: SECOND SEMESTER		
Course #	Course Name	Credits
CBE 230	Advanced API Development	3
CBE 235	Advanced Databases and Data Caches	3
CBE 240	Live Work II for Back-end	6

Blockchain Track

YEAR II: FIRST SEMESTER		
Course #	Course Name	Credits
BA 215	Personal Finance (Required)	3
CBC 210	Intermediate Smart Contracts	3
CBC 215	Blockchain Tokenomics	3
CBC 220	Intermediate Distributed Application Development	3
CBC 225	Live Work I for Blockchain	3
ENGL 106	Technical Writing-Coding Documentation	3

YEAR II: SECOND SEMESTER		
Course #	Course Name	Credits
CBC 230	Advanced Smart Contracts	3
CBC 235	Advanced Distributed Application Development	3
CBC 240	Live Work II for Blockchain	6

Development & Operations Track

YEAR II: FIRST SEMESTER		
Course #	Course Name	Credits
BA 215	Personal Finance (Required)	3
CDO 210	Cloud Systems	3
CDO 215	CI/CD Continuous Integration/Continuous Deployment	3
CDO 220	Applications Security	3

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CDO 225	Live Work I for Development and Operations	3
ENGL 106	Technical Writing-Coding Documentation	3

YEAR II: SECOND SEMESTER

Course #	Course Name	Credits
CDO 230	Advanced Scripting	2
CDO 235	System Monitoring and Billing	2
CDO 240	Live Work II for Development and Operations	6
CDO 245	Container Management	2

Front-end Track

YEAR II: FIRST SEMESTER

Course #	Course Name	Credits
BA 215	Personal Finance (Required)	3
CFE 210	Intermediate Front-end Web Development	3
CFE 215	Native iOS Development	3
CFE 220	Native Android Development	3
CFE 225	Live Work I for Front-end	3
ENGL 106	Technical Writing-Coding Documentation	3

YEAR II: SECOND SEMESTER

Course #	Course Name	Credits
CFE 230	Native Development	3
CFE 235	Advanced Front-end Development	3
CFE 240	Live Work II for Front-end	6

Product Design & Project Management Track

YEAR II: FIRST SEMESTER

Course #	Course Name	Credits
BA 215	Personal Finance (Required)	3
CPD 210	Responsive Design	3
CPD 215	UI/UX User Interface/User Experience	3
CPD 220	Team Management	3
CPD 225	Live Work I for Product Design	3
ENGL 106	Technical Writing-Coding Documentation	3

YEAR II: SECOND SEMESTER

Course #	Course Name	Credits
CPD 230	Advanced Team Management	3
CPD 235	Advanced UI/UX User Interface/User Experience	3
CPD 240	Live Work II for Product Design & Project Management	6

COURSE DESCRIPTIONS

First Year Core Courses

CCC 110 OBJECT ORIENTED PROGRAMMING

3 CR

This course is an introduction to using Object Oriented Design in programming. Focus is placed on design principles like SOLID and common design patterns. The languages used will be Apple Swift and JavaScript. By the end of this course a student should have made a shift in the understanding of procedural programming to object-oriented programming.

CCC 115. PROGRAMMING IN SWIFT.

3 CR

This is an introductory course to iOS software architecture and programming with a focus on application development. Students will use common frameworks to build utility apps. They will become familiar with Xcode and its debugging tools. They will also review common coding concepts including variables, loops, and conditional statements.

CCC 120. FRONT-END WEB DEVELOPMENT.

3 CR

This course is an introduction to HTML5, JavaScript, and CSS3. Throughout the course, there will be activities to promote learning basic HTML syntax along with modifying the look with CSS and the action with JavaScript. By the end of the course students will have a functional web game that is responsive to different screen sizes and keeps score.

CCC 125. BLOCKCHAIN AND CRYPTOCURRENCY FUNDAMENTALS.

3 CR

The block chain offers new ways to build apps that are decentralized rather than stored on a single cloud. In this course, students will learn how blockchain works and how it can be used to keep track of transactions, products, and many other things. This immutable ledger will be used throughout this program as students build modern decentralized apps

CCC 130. SOFTWARE DESIGN 1

4 CR

This course focuses on live work with teams. Students fulfill different roles that are common in a professional development environment. Each student will practice each of the roles as the class progresses through multiple simulated and real projects.

CCC 135. DESIGN AND FRONTEND WEB DEVELOPMENT

3 CR

In this course, students will play the role of both the designer and the frontend developer. Students will create designs and implement them in responsive web apps using a Javascript framework.

CCC 140. ADVANCED PROGRAMMING IN SWIFT

4 CR

This course covers advanced topics in iPhone development. Students will parse JSON and dynamically create views from data stored locally or on the cloud, use Geolocation and Maps to present data, and use requests to post data to their own express servers. SwiftUI will be used to make interfaces look good on all devices. A primary goal is to learn how to research and implement a new feature using their API documentation.

CCC 145. CRYPTOCURRENCY SMART CONTRACTS

3 CR

This course will go through reading, writing, and debugging smart contracts. It will look into best practices that will prevent the contract from being used in a malicious manner. This course builds off of previous courses with a much more in depth look into the Solidity programming language.

CCC 150. DISTRIBUTED APP DEVELOPMENT

3 CR

This course focuses on creating frontend applications that connect and talk to the smart contracts that are found in cryptocurrencies.

Second Year Option: Blockchain Track.

CBC 210. INTERMEDIATE SMART CONTRACTS

3 CR

In this course, students will continue the journey into learning the Solidity language. Students will cover intermediate topics that build upon the skills learned in the first course. There will be more focus on testing the contracts and creating contracts that will last a long time. We will look at syntax that makes the code more modular and we will look at common security threats that can affect a contract. By the end of this course, students should be at a level where they can get to a point where their smart contracts are ready for auditing.

CBC 215. BLOCKCHAIN TOKENOMICS

3 CR

This course looks at the metrics that can make a Token valuable. We will look at token supply, token distribution, token utility, governance, staking, and market dynamics. This course will go through the process of designing the tokenomics for a token that we could use in a project. Our focus will be on making it sustainable and robust.

CBC 220. INTERMEDIATE DISTRIBUTED APPLICATION DEVELOPMENT

3 CR

Students will continue the journey toward making distributed applications that talk to smart contracts. We will focus on writing cleaner code and focus on ordering our asynchronous code. We will listen for events emitted from the blockchain and go through different ways to troubleshoot your DAPP.

CBC 225. LIVE WORK I FOR BLOCKCHAIN

3 CR

In this course, students will work in teams with students from other pathways to complete live work. There will be mentors to help bridge the gap between learning in the classroom and gaining experience in the career field. In this track, students will focus on smart contracts, managing tokens, and creating distributed apps.

CBC 230. ADVANCED SMART CONTRACTS

3 CR

This course will focus on finalizing the journey in learning the Solidity language. Students will be able to read, write, and distribute smart contracts on the blockchain. These contracts will be secure and well written to prevent apps from being hacked.

CBC 235. ADVANCED DISTRIBUTED APPLICATION DEVELOPMENT

3 CR

This course covers more advanced topics in Web3 development. Students will continue to improve skills when working with smart contracts with our distributed applications. Our main focus will be finalizing the applications for deployment. This will include auditing the contracts, testing the apps, and preparing for submission to a main network where it will live on forever.

CBC 240. LIVE WORK II FOR BLOCKCHAIN

3 CR

In this course, students will work in teams with students from other pathways to complete live work. There will be mentors to help the gap between learning in the classroom and gaining experience in the career field. In this track, students will focus on blockchain and DAPP technologies.

Second Year Option: Back-end Track

CBE 210. API DEVELOPMENT

3 CR

This course focuses on developing APIs that frontend developers will connect to. We will look at best practices in naming conventions and different methods of sending and receiving the data. This will include planning an upgrade to an existing API without breaking apps that currently rely on it.

CBE 215. MICROSERVICES AND SERVERLESS

3 CR

This class covers creating cloud functions and microservices that allow students to design more scalable apps that are not monoliths. Students will build microservices in the cloud and see how they work when connecting them to an app or other microservices. There will be a focus on using single responsibility for each service along with preventing one fault from taking down the entire system.

CBE 220. DATABASE MANAGEMENT

3 CR

Students will learn to implement both SQL and NoSQL type databases. Students will focus on designing the schema and being able to query it using SQL or JavaScript functions. Students will also build simple APIs to fetch, update, and remove data. We will also look at common patterns we should use in building a database along with patterns we should avoid.

CBE 225. LIVE WORK I FOR BACKEND

3 CR

In this course, students will work in teams with students from other pathways to complete live work. There will be mentors to help students along the way to help bridge the gap between learning in the classroom. In this track, students will be in charge of the database and any microservices or serverless functions that are needed.

CBE 230. ADVANCED API DEVELOPMENT

3 CR

In this course students look at more advanced patterns when working with APIs. Students will also look at ways of improving efficiency and making sure APIs are secure. This will include creating unit tests to ensure that the API is behaving properly.

CBE 235. ADVANCED DATABASES AND DATA CACHES

3 CR

In this course, students will get a more in-depth knowledge of SQL and NoSQL Databases. There will be a focus on Graph databases along with peer-to-peer databases. Students will look at best practices in designing and implementing these solutions. We will also look at migrating from one type of database to another.

CBE 240. LIVE WORK II FOR BACKEND

3 CR

In this course, students will work in teams with students from other pathways to complete live work. There will be mentors to help bridge the gap between learning in the classroom. Students will continue to work in the role of a Back-end developer, which includes maintaining the API, setting up the databases, and ensuring the front-end developers can get the data they need.

Second Year Option: Development and Operations Track

CDO 210. CLOUD SYSTEMS

3 CR

This course will prepare students to take the AWS CCP certification. Students will look at tools available to them in multiple cloud services. Our focus is AWS but we will also look at other providers like Azure and Google Cloud. Students will compare advantages and disadvantages of using a cloud system vs. a decentralized peer to peer system while implementing many of them in hands on projects.

CDO 215. CONTINUOUS INTEGRATION / CONTINUOUS DELIVERY

3 CR

This course will focus on building the code pipelines that allow students to test and deploy code using as much automation as needed to improve the workflow. Some of the scenarios we will look at include creating a new project from scratch, rolling out changes on an existing project, and rolling back changes due to an error that made it to production.

CDO 220. APPLICATIONS SECURITY

3 CR

This course focuses on understanding and protecting the application and system from common security risks. It will look at risks in both centralized and decentralized applications. We will look at where to find logs and how to read them. We will also look at different types of attacks and how to prevent them when possible. We will also focus on how to keep up to date with the latest security vulnerabilities in this ever-changing landscape.

CDO 225. LIVE WORK I FOR DEVELOPMENT AND OPERATIONS

3 CR

Students will work in teams with people from different tracks to complete live work. Students in this course will focus on handling the Dev Ops aspect of the project for the team.

CDO 230. ADVANCED SCRIPTING

3 CR

In this course, students will learn to build scripts as well as popular commands for Linux, AWS, and more. With these scripts, students can speed up deployment and have better control over the system.

CDO 235. SYSTEM MONITORING AND BILLING

3 CR

This course focuses on budgeting and planning apps so that they make money instead of costing money. Students will look at tools to monitor cloud systems along with calculating costs of running a decentralized app on a popular network like Ethereum.

CDO 245. CONTAINER MANAGEMENT

3 CR

This course will focus on using tools like Docker and Kubernetes. With these tools, students can have controlled environments that can be deployed without any surprises of missing plugins or incompatible versions of software. This will include using Docker locally along with using it in AWS.

CDO 240. LIVE WORK II FOR DEVELOPMENT AND OPERATIONS

3 CR

In this course, students will work in teams from other tracks to complete live work. There will be mentors to help students along the way to help bridge the gap between learning in the classroom. In this track, students will perform the role of a Dev Ops engineer.

Second Year Option: Front-end Track

CFE 210. INTERMEDIATE FRONT END WEB DEVELOPMENT

3 CR

In this course, students will dive deeper into creating apps using the latest Web Development Frameworks. Students will look at more advanced Typescript and CSS features. There will be a big focus on fetching data from other sources and displaying them to the specifications of the design.

CFE 215. NATIVE IOS DEVELOPMENT

3 CR

This course focuses on using SwiftUI to build interfaces designed by a graphics professional. Students will implement animations and connect to backend servers to get live updating content.

CFE 220. NATIVE ANDROID DEVELOPMENT

3 CR

Students will build native Android Apps that are graphically designed ahead of time. There will be a focus on implementing the design to fit multiple screens and the ability for the app to use sources built by our backend team.

CFE 225. LIVE WORK I FOR FRONT-END

3 CR

In this course, students will work in teams with students from other pathways to complete live work. There will be mentors to help bridge the gap between learning in the classroom and gaining experience in the career field. In this track, students will focus on building the iOS, Android, or Web Application of the live work project.

CFE 230. NATIVE DEVELOPMENT

3 CR

In this course students will be given mobile application challenges. Students can implement the apps using their choice of Swift for iOS or Kotlin for Android. One of these challenges is a simple utility application that they will design themselves and submit to either the Apple App Store or the Google Play Store.

CFE 235. ADVANCED FRONTEND WEB DEVELOPMENT

3 CR

This course focuses on practicing the skills from the previous web front-end courses while also introducing more advanced concepts. Students will be challenged with designs and animations designed by graphics students and will be graded on their sites' accessibility

CFE 240. LIVE WORK II FOR FRONT-END

3 CR

In this course, students will work in teams with students from other pathways to complete live work. There will be mentors to help bridge the gap between learning in the classroom and gaining experience in the career field. Student's focus in this track will be implementing designs using either Web, Android, or iOS.

Second Year Option: [Product Design & Project Management](#)

CPD 210. RESPONSIVE DESIGN

3 CR

This course focuses on creating designs for multiple screens. This can include phones, tablets, watches, TVs, and more. Students will look at the way that Web, iOS, and Android would handle and implement these designs.

CPD 215. UI / UX USER INTERFACE/USER EXPERIENCE

3 CR

This course focuses on usability best practices. Students will look at Apple's Human Interface Guidelines along with Google's Material Design. Students will also focus on accessibility for those with visual or auditory challenges or deficits

CPD 220. TEAM MANAGEMENT

3 CR

This course will use Agile practices to keep the team on task and motivated to build a product they all can be proud of. Part of this will be how to work with employees to handle conflict and keep the team going in the right direction.

CPD 225. LIVE WORK I FOR PRODUCT DESIGN AND PROJECT MANAGEMENT

3 CR

In this course, students will work in teams with students from other pathways to complete live work. There will be mentors to help bridge the gap between learning in the classroom and gaining experience in the career field. This track focuses on designing the application and managing the team along the way.

CPD 230. ADVANCED TEAM MANAGEMENT

3 CR

In this course, students will work with more advanced tools to manage and track their team. Students will practice with projects at a much larger scale than in the previous course.

CPD 235. ADVANCED UI / UX USER INTERFACE/USER EXPERIENCE

3 CR

Students will continue to develop prototypes for a range of problems that can be solved with mobile applications. Students will also implement usability tests and gather the results from it so that they can make more informed decisions in the design.

CPD 240. LIVE WORK II FOR PRODUCT DESIGN AND PROJECT MANAGEMENT

3 CR

In this course, students will work in teams with students from other pathways to complete live work. There will be mentors to help bridge the gap between learning in the classroom and gaining experience in the career field. In this track, students will focus on creating the designs and managing the teams.