Presidential Initiative for Artificial Intelligence and Computing (PIAIC)

https://www.piaic.org

Certified Web 3.0, AI, and Metaverse Developer

A One and Quarter Years Panaverse DAO Earn as you Learn Program

Getting Ready for the Next Generation of the Internet

Consolidating Web 3.0, Metaverse, Artificial Intelligence (AI), Cloud, Edge, Ambient Computing/IoT, Network Automation, and Bioinformatics Technologies

The Panaverse Community and Syllabus: https://www.panaverse.co

Version 7.0.0 - May 2023

The internet is without a doubt the most important technological development in human history. The rate of technological development is accelerating exponentially. What previously took a decade will now take 6 months or less. Mass adoption of AI, Web3, the metaverse is just around the corner. It will expand the internet as we know it by introducing novel features and advancements. The next generation of internet application development will make use of all aspects of modern technology, including AI, 3D, VR, AR, blockchain, cloud and edge computing, voice computing, ambient computing, and more.

Recently developed generative platforms for artificial intelligence like ChatGPT, and Amazon's Bedrock will serve as a base upon which various internet apps will be developed, upending the entire software industry. We must consider these new generative AI systems as a new kind of operating systems, rather than software, upon which internet applications will be created.
Reference: https://www.bloomberg.com/opinion/articles/2023-04-19/ai-is-challenging-operating-system-supremacy

Most businesses want to employ these enormous generative language models in developing their apps , but training them costs billions of dollars and takes years, and most businesses don't want to go through that. So what they want to do is work off of a foundational model (FM) that's already big and great and then customise it for their own purposes. We will learn to do exactly that in this course and integrate them in the Internet apps we built. Startup enterprises, particularly those with limited resources, will be able to bring their products to market more rapidly and efficiently with the support of these FMs.
Reference:
https://aws.amazon.com/blogs/machine-learning/announcing-new-tools-for-building-with-generative-ai-on-aws/

Web3 and metaverse is also moving at a breakneck speed. Citi is the latest Wall Street business to give a positive prognosis for Web 3.0 and the Metaverse, terms used to depict a future internet vision centered on decentralized technologies and virtual worlds. Citi stated in a March 2022 research paper that the metaverse economy might have a total addressable market of up to $13 trillion and five billion people by 2030. We will also learn to integrate these
Reference: https://www.citivelocity.com/citigps/metaverse-and-money/

To summarize this program will teach students how to create cutting-edge Internet apps that are essentially cloud-based and employ Serverless, Edge, CDN, and Event-Driven technologies. They effortlessly integrate Web 3.0, AI, and 3D technology to create applications with revolutionary next-generation capabilities.

The Essence of the Program: Earn While You Learn
In this brand-new type of curriculum, students will learn how to generate revenue and boost exports in the classroom and will begin doing so within six months of the program's beginning. It resembles a cross between a corporate venture and an educational project.

Program of Studies
This curriculum is intended for beginners who want to learn software development from the ground up. The first three quarters are shared by all specialties and are dedicated to studying Object-Oriented Programming and cutting-edge Full-Stack Web 2.0 development. It is going to be a fifteen-month-long hybrid program that includes both onsite and online classes and is divided into five quarters of 13 weeks each. The emphasis will be on hands-on learning by educating students to produce projects. To accommodate everyone, courses will be held primarily on weekends or after 6:00 p.m. (Pakistan Time) on weekdays. It employs a hybrid teaching format, with core onsite classes complemented by online Zoom laboratories and recorded videos.

Core Courses (Common in All Specializations):
Every participant of the program will start by completing the following three core courses:

> **Quarter I (Core)**
> **CS-101: Object-Oriented Programming using TypeScript**
>
> **Quarter II (Core)**
> **W2-201: Developing Planet-Scale Web 2.0 Serverless Cloud Cloud Apps and APIs using Next.js 13, TailwindCSS, and Serverless PostgreSQL Databases**
>
> **Quarter III (Core)**
> **$-301: Dollar Making Bootcamp - Full-Stack Template, API, and Product Development**
>
> **W3-301: Developing Web 3.0 DApps using Solidity, Ethers.js, Hardhat, and Account Abstraction**
>
> **AI-301: Generative AI Application Development using ChatGPT APIs/Plugins, Amazon's Bedrock, and Microsoft's Semantic Kernel**

Specialized Tracks:
After completing the first three quarters the participants will select one or more specializations consisting of two courses each:

   I.   **Web 3.0 (Blockchain) and Metaverse Specialization**
        This Web 3.0 and Metaverse specialization focuses on developing full-stack Web 3.0 and Metaverse experiences for the next generation of the internet by specializing in building worlds that merge the best of cutting-edge decentralized distributed blockchains with 3D metaverse client experiences.

        Quarter IV
        W3-351: Developing Advanced Smart Contracts and Oracles and Planet-Scale Web 3.0 DApps

        Quarter V

MV-361: Developing Planet-Scale Open Virtual and Augmented Metaverse Experiences

II. **Artificial Intelligence (AI) and Deep Learning Specialization**
The AI and Deep Learning specialization focuses on building and deploying intelligent APIs using OpenAI models and building custom Deep Learning Tensorflow models.

Quarter IV
AI-351: Developing Planet-Scale Intelligent APIs and Python Programming

Quarter V
AI-361: Deep Learning and MLOps

III. **Cloud-Native Computing Specialization**
The Cloud-Native Computing Specialization focuses on Containers, Kubernetes, and CDK for Kubernetes.

Quarter IV
CN-351: Certified Kubernetes Application Developer (CKAD)

Quarter V
CN-361: Developing Multi-Cloud APIs using CDK for Terraform

IV. **Ambient Computing and IoT Specialization**
The Ambient Computing and IoT Specialization focuses on building Smart Homes, Offices, Factories, and Cities using Voice computing, Matter Protocol, and Embedded Devices.

Quarter IV
AC-351: Ambient Computing with Voice Assistants and Matter Protocol Devices

Quarter V
AC-361: Embedded Programming using C and Rust

V. **Genomics and Bioinformatics Specialization**
Genomics is the study of the total genetic makeup of individual organisms, and how this genetic information is structured, functions, and has evolved; bioinformatics encompasses a diverse range of analytical methods and tools applied to genomic data. This Specialization focuses on performing complex bioinformatics analysis using the most essential Python libraries and applications.

Quarter IV
Bio-351: Python for Biologists

Quarter V
Bio-361: Bioinformatics with Python

VI. **Network Programmability and Automation Specialization**
More than ever, network engineers are finding it challenging to complete their duties entirely manually. Network automation is now crucial due to new protocols, technologies, delivery models, and the requirement for enterprises to become more adaptable and agile. This course teaches network engineers how to automate systems with code using a variety of

technologies and tools, including Linux, Python, APIs, and Git.

Quarter IV
NPA-351: CCNA 200-301 Certification

Quarter V
NPA-361: Network Programmability and Automation

The Outcome for Participants of the Program
The graduates of this program will own products (Full-Stack App Templates, AR and VR Experiences, and APIs) that are marketed globally by the Panaverse DAO and, if they like, will also be able to start off by offering services at a rate of $50 per hour ($96,000 per year). This would give Pakistani professionals and students a fantastic opportunity to better their financial situation while also giving the economy a much-needed boost by expanding software exports.

1. Top 5 'Metaverse' jobs that will rule the future of tech industry
   https://content.techgig.com/hiring/top-5-metaverse-jobs-that-will-rule-the-future-of-tech-industry/articleshow/87581325.cms

2. Blockchain Developer Salary - Jun 2022
   https://web3.career/web3-salaries/blockchain-developer

3. Web3 Salaries Soar to $750,000 for Rank-and-File Devs
   https://thedefiant.io/web3-soaring-salaries/

4. The Metaverse, Blockchain Gaming, and NFTs: Navigating the Internet's Uncharted Waters
   https://newzoo.com/insights/trend-reports/newzoo-report-on-metaverse-blockchain-gaming-nft-2022

5. How To Become Metaverse Developer: Scope, Skills, and Salary
   https://www.blockchain-council.org/metaverse/how-to-become-metaverse-developer/

Relevant Information Links:
Admission Website: https://www.piaic.org/
Syllabus and Community Website: https://www.panaverse.co/
Facebook: https://www.facebook.com/groups/panaverse
YouTube Live Channel: https://www.youtube.com/@panaverse/streams
GitHub Repos: https://github.com/panaverse
Twitter: https://twitter.com/Panaverse_edu

Detailed Course Syllabus

Quarter I (Core)
CS-101: Object-Oriented Programming using TypeScript
Duration: 13 Weeks

Course Description:

We will start the program by learning the fundamentals of Object-Oriented programming using JavaScript and TypeScript. We will also understand the latest Web trends i.e. Web 3.0 and Metaverse concepts and try to understand their working from the perspective of the users.

Course Outline:

1. **HTML and CSS (Homework)**

   Learn HTML by Hira Khan (Watch Recorded Videos)
   https://www.youtube.com/playlist?list=PLKvqnz8z1zWQ3BALy86tIXICkG874wAc6

   Learn CSS Intro by Hira Khan (Watch Recorded Videos)
   https://www.youtube.com/playlist?list=PLKvqnz8z1zWQSWIen_zUSEBmtqzPLuRob

2. **Web 3.0 and Metaverse Theory**

   Introduction to Panaverse DAO

   https://docs.google.com/presentation/d/12C1s4UBTlR9nZNEkRE6aAuGeRA3s92jx-8nJKo9jdH4/edit?usp=sharing

   Web 3.0 User Guide

   https://docs.google.com/presentation/d/1FSbr9aJwO0-fmZHqWy_eHO2N_jwJLmQCy4cG8rd4ctw/edit?usp=sharing

   Complete Web 3 Assignments included in the Web 3 User Guide

   Virtual and Augmented Metaverse User Guide
   https://docs.google.com/presentation/d/1ADk87hQ0Etr2PfmN9XH7TQ0CHl6XSP_7JWNUbzPdDNc/edit?usp=sharing

   3D E-commerce

   First, in our Web 3 and Metaverse program, we are learning to develop Web 1, and Web 2 websites and apps. Later we will learn to develop Web 3 and 3D Commerce templates and experiences.

   But we have to start thinking right now. Let's understand what one virtual store builder company is doing the company name is Emperia.

   https://emperiavr.com/

   "Using technology, Emperia aims to make virtual worlds into the future of e-commerce, expanding the reach to new and future online shoppers, increasing

brand loyalty, and creating a completely new shopping experience."

Emporia just got funded:
https://www.retail-insight-network.com/news/emperia-10m-growth/

Checkout the Virtual Store Demos:
https://emperiavr.com/projects/

3. **Fundamentals of Typescript**

TypeScript Presentation
https://docs.google.com/presentation/d/1-7Kb3laJjJ68mOTF9v0fHImk5vTol0CeE43Sg8hoUXQ/edit?usp=sharing

Getting Started Exercises with TypeScript and Node.js
https://github.com/panaverse/typescript-node-projects/blob/main/getting-started-exercises.md

Fundamentals of JavaScript and Node.js Quiz

Topics Covered in the Quiz:

   A. Background of JavaScript and How to use JavaScript in Browser
   B. Variables, Primitive data types Analyzing and modifying data types, and Operators (Chapter 2 of JavaScript from Beginner to Professional)
   C. Intro to Node.js, .mjs files, Modules, NPM, import, export, and using external modules with npm:
   https://docs.google.com/presentation/d/1eOLJTN0FyVAw6lMUvA_XYLORKnudWXyzXsB6sg5oPIs/edit?usp=sharing
   D. How to accept user input in your Node.js JavaScript programs, this will allow us to create interactive Node.js console programs using prompt-sync library. The last example in this presentation shows you how to use prompt-sync library in your Node.js programs:
   https://docs.google.com/presentation/d/1eOLJTN0FyVAw6lMUvA_XYLORKnudWXyzXsB6sg5oPIs/edit?usp=sharing
   Note: After this point, we will do all our class work and exercises using Node.js in .mjs files. We will also be able to develop interactive Node.js console programs which will greatly help the students to learn.
   E. Using Arrays and Objects in Node.js Programs (chapter 3 of JavaScript from Beginner to Professional)
   F. Using if and if else statements, else if statements, Conditional ternary operators, and switch statements in Node.js programs (chapter 4 of JavaScript from Beginner to Professional)
   G. Using while loop, do while loop, for loop, for in, and for of loop in Node.js (chapter 5 of JavaScript from Beginner to Professional)
   H. Using Basic functions, Function arguments, Return, Variable scope in functions, Recursive functions, Nested functions, Anonymous functions, and Function callbacks in Node.js (chapter 6 of JavaScript from Beginner to Professional)
   I. Using Concurrency, Callbacks, Promises, async / await, and Event loop (chapter 13 of JavaScript from Beginner to Professional)
   J. JavaScript promises, mastering the asynchronous
   https://www.codingame.com/playgrounds/347/javascript-promises-mastering-the-asynchronous/what-is-asynchronous-in-javascript
   K. New JavaScript Features in ECMAScript 2022 and 2021
   https://dev.to/brayanarrieta/new-javascript-features-ecmascript-2022-with-examples-4nhg

4. Object-Oriented Programming with TypeScript

Chapters 1-11 of Learning TypeScript: Enhance Your Web Development Skills Using Type-Safe JavaScript
https://www.amazon.com/Learning-TypeScript-Development-Type-Safe-JavaScript/dp/1098110331/ref=sr_1_1

Learning Repository
https://github.com/panaverse/learn-typescript

In Class Companion projects and articles for Learning TypeScript
https://www.learningtypescript.com/

Homework Project
https://github.com/panaverse/typescript-node-projects

Fundamentals of TypeScript Quiz

TypeScript Professional Proficiency Quiz

5. TypeScript for React

Minimal TypeScript Crash Course For React
With Interactive Code Exercises
https://profy.dev/article/react-typescript

Quarter Break Assignments and Quizzes

During the Quarter Break, we do the following Assignments:

1. https://github.com/panaverse/learn-nextjs/tree/main/assignment00_cloud_to_edge

2. https://github.com/panaverse/learn-nextjs/tree/main/assignment01_todo_app

3. https://github.com/panaverse/styling-nextjs-projects/tree/main/project00_pricing_ui

4. Build a Panaverse DAO Syllabus Website using Next.js 13 given the content from the following document:
https://docs.google.com/document/d/13Z4tMKQmZpMEsOc1Y_qAXbOstRolGIFupHxQFgAFl98/edit?usp=sharing

The best-developed Website will be hosted on www.panaverse.co domain.

5. Build a new PIAIC Website using Next.js 13 given the content from the current PIAIC Website and from the following document:
https://docs.google.com/document/d/13Z4tMKQmZpMEsOc1Y_qAXbOstRolGIFupHxQFgAFl98/edit?usp=sharing

The best-developed Website will be hosted on www.piaic.org domain.

After completing the above Five Assignments everyone will appear in the following two Quizzes covering Github and TypeScript:

1. **Fundamentals of Version Control with Git Quiz**

Version Control using Git and GitHub By Sir Zeeshan Hanif (Watch Recorded Videos)

Chapters 1, 2, 3, and 4 Learn Version Control with Git: A step-by-step course for the complete beginner by Tobias Günther

We will also cover these readings:
https://help.github.com/articles/markdown-basics/
http://stackoverflow.com/questions/5009600/difference-between-fork-and-branch-on-github
http://stackoverflow.com/questions/3329943/git-branch-fork-fetch-merge-rebase-and-clone-what-are-the-differences
https://git-scm.com/book/en/v2/Git-Branching-Rebasing
http://git-scm.com/book/en/v2/Git-Branching-Remote-Branches#Tracking-Branches

For practice: https://try.github.io/levels/1/challenges/1

Homework:
https://www.datacamp.com/courses/introduction-to-git-for-data-science

Git Cheatsheet
https://www.kdnuggets.com/2022/11/git-data-science-cheatsheet.html

Git Quiz
Total Questions: 60, Total Time: 75 minutes

2. **TypeScript Proficiency Quiz**
Total Questions: 63
Duration: 120 minutes

Study Material:

https://github.com/panaverse/learn-typescript

Quarter II (Core)

W2-201: Developing Planet-Scale Web 2.0 Serverless Cloud Apps and APIs using Next.js 13 and Cloud Development Kit (CDK) for Terraform

Duration: 13 Weeks

Course Description:

The objective of this course is to teach participants to develop customer-facing planet-scale Websites, Full-Stack Apps and templates, Dashboards, and Muti-Cloud Serverless APIs. By the end of the quarter, the participants will be able to develop and deploy web platforms like Facebook, Shopify, etc. The technologies covered in this course will include Next.js 13, Figma, Tailwind CSS, Chakra UI, tRPC, QraphQL, Prisma, Cockroachdb Serverless (PostgreSQL Compatible), AWS Serverless Technologies, and Cloud Development Kit for Terraform (CDKTF).

Course Outline:

1. **Next.js 13 Web Development**

   Next 13 Official Documentation
   https://beta.nextjs.org/docs

   Latest Learn React Official Website
   https://beta.reactjs.org/learn

   Learn Next.js 13 Learning Repo
   https://github.com/panaverse/learn-nextjs

   First Project for Quarter 2 Students: Build a Resume Website and Deploy it on a Custom Domain

   All Quarter 2 students are required to Build their resume/CV website using Next.js 13 and Tailwind CSS

   Watch this video to learn:
   https://morioh.com/p/45a246d927c9

   Once you have built your resume website, buy a domain if you can afford it and host your resume website on a custom domain:
   https://www.godaddy.com/en-pk

   Add your custom domain to your Vercel Project:
   https://vercel.com/docs/concepts/projects/domains
   https://vercel.com/docs/concepts/projects/domains/add-a-domain

   However, if you cannot afford it find a way to get it for free:
   https://www.forbes.com/advisor/business/free-domain-name/

   You will get your website graded by a faculty member in class and receive a Report Card which you will always bring to class.

2. **Next.js 13 using Chakra UI (Remote Zoom Class)**

CSS Flexbox Explained – Complete Guide to Flexible Containers and Flex Items
https://www.freecodecamp.org/news/css-flexbox-complete-guide/

Chakra UI Docs
https://chakra-ui.com/getting-started

3. UI/UX Design with Figma, TailwindCSS, and Chakra UI (Remote Zoom Class)

Designing and Prototyping Interfaces with Figma: Learn essential UX/UI design principles by creating interactive prototypes for mobile, tablet, and desktop by Fabio Staiano
https://www.amazon.com/Designing-Prototyping-Interfaces-Figma-interactive/dp/180056418X/ref=sr_1_1_sspa

Figma Design Kit for TailwindCSS
https://www.figma.com/community/file/768809027799962739

Chakra UI Figma Kit
https://www.figma.com/community/file/971408767069651759

4. API Routes with Next.js (Remote Zoom Class)

API Routes
https://nextjs.org/docs/api-routes/introduction

5. APIs with Next.js and tRPC (Remote Zoom Class)

Build a tRPC CRUD API Example with Next.js
https://codevoweb.com/build-a-trpc-crud-api-example-with-next-js/

Stop building REST APIs for your Next.js apps, use tRPC instead
https://brockherion.dev/blog/posts/stop-building-rest-apis-for-your-next-apps/

6. SQL and Prisma

Start from scratch with relational databases
https://www.prisma.io/docs/getting-started/setup-prisma/start-from-scratch/relational-databases-typescript-postgres

SQL For Beginners Video Tutorial
https://www.youtube.com/watch?v=5hzZtqCNQKk

Database Management Systems and SQL – Tutorial for Beginners
https://www.freecodecamp.org/news/dbms-and-sql-basics/

7. Next.js 13 using TailwindCSS (Remote Zoom Class)

Modern CSS with Tailwind, Second Edition by Noel Rappin
https://pragprog.com/titles/tailwind2/modern-css-with-tailwind-second-edition/

Web 2.0 Projects

1. Next.js Projects
https://github.com/panaverse/nextjs-projects

2. Styling Next.js Projects using TailwindCSS and Chakra UI

3. **Todo Full-Stack App**
   https://github.com/ogzhanolguncu/min-todo

4. **Build a Twitter Clone**
   https://www.youtube.com/watch?v=nzJsYJPCc80

Quarter III (Core)

Duration: 13 Weeks

$-301: Dollar Making Bootcamp - Full-Stack Template and API Product Development

Earn While You Learn Projects

A. Build Full-Stack Next.js 13 Jamstack Templates

You will be assigned to build a template which we will sell on Theme Forest and Panaverse DAO marketplace. The Panaverse DAO will receive 25% share on the sale of the template which will be used to manage the platform. An additional 15% will be spent on marketing the template. 60% of the revenues will be distributed to the developer through the Panaverse DAO in the form of Panaverse tokens.

The Template Standard
https://github.com/panaverse/panaverse-template-standard

B. Build APIs and Products

You will be assigned to build APIs for which you will sell subscriptions on the Panaverse DAO Marketplace. The Panaverse DAO will receive 25% share on the sale of the template which will be used to manage the platform. An additional 15% will be spent on marketing the template. 60% of the revenues will be distributed to the developer through the Panaverse DAO in the form of Panaverse tokens.

W3-301: Developing Web 3.0 DApps using Solidity, Ethers.js, Hardhat, and Account Abstraction

1. **Smart Contract Development in Solidity**

   Solidity Programming Essentials - Second Edition By Ritesh Modi
   https://www.packtpub.com/product/solidity-programming-essentials-second-edition/9781803231181

   Solidity Learning Repo
   https://github.com/panaverse/learn-nextjs/tree/main/stepxx_web3

2. **Dapp Development using Ethers.js and Next.js 13**

   Dapp Learning Repo
   https://github.com/panaverse/learn-nextjs/tree/main/stepxx_web3

AI-301: Generative AI Application Development using ChatGPT APIs/Plugins and Amazon's Bedrock

1. **Next.js 13 with ChatGPT**
   Build a Next JS 13.3 App with Auto ChatGPT Content
   https://www.youtube.com/watch?v=pfHjxyeCHRs

   ChatGPT Bot with NEXT.JS 13 and OpenAI API in 10 minutes
   https://www.youtube.com/watch?v=I14_HrJktIs

2. **Amazon Bedrock**
   The easiest way to build and scale generative AI applications with foundation models (FMs)
   https://aws.amazon.com/bedrock/

3. **Microsoft's Semantic Kernel SDK**
   A bridge between large language models and your code
   https://github.com/microsoft/semantic-kernel
   https://learn.microsoft.com/en-us/semantic-kernel/whatissk
   https://www.linkedin.com/learning/introducing-semantic-kernel-building-ai-based-apps/introducing-semantic-kernel
   https://learn.microsoft.com/en-gb/semantic-kernel/

Web 3 and Metaverse Specialization

Quarter IV

W3-351: Developing Advanced Smart Contracts and Oracles and Planet-Scale Web 3.0 Dapps

Duration: 13 Weeks

Course Description:

In this course, you will learn how to develop Web 3.0 DApps, create a project, deploy it in production, write smart contracts, unit test them, and create user interfaces for them. We will also learn to develop ERC-20 and NFT tokens, DAOs, Oracles, etc. Please note that in order to develop Web 3 applications you also need to build on top of Web 2.0 technologies which we have already covered in the previous quarters.
https://javascript.plainenglish.io/why-you-should-learn-web-2-0-before-getting-into-web-3-0-d251625990db

Course Outline:

3. **Blockchain and Metaverse Theory**

   The Metaverse: And How It Will Revolutionize Everything by Matthew Ball
   https://www.amazon.com/Metaverse-How-Will-Revolutionize-Everything/dp/1324092033/ref=tmm_hrd_swatch_0

   Mastering Blockchain - Fourth Edition by Imran Bashir
   https://www.packtpub.com/product/mastering-blockchain-fourth-edition/9781803241067

4. **Smart Contract Development in Solidity**

   Solidity Programming Essentials - Second Edition By Ritesh Modi
   https://www.packtpub.com/product/solidity-programming-essentials-second-edition/9781803231181

   Solidity Learning Repo
   https://github.com/panaverse/defi-dapps-solidity-smart-contracts

5. **Dapp Development using Ethers.js and Next.js 13**

   Dapp Learning Repo
   https://github.com/panaverse/dapps-nextjs

6. **Tokennomics**

7. **Blockchain Project: Create a Token and Launch ICO/IEO/IDO**

   As you probably know, the ICO ("Initial Coin Offering") industry has been booming, and it's completely reinventing the way new startups kickstart themselves. In fact, have a look at Wikipedia's list of highest crowdfunding projects https://en.wikipedia.org/wiki/List_of_highest-funded_crowdfunding_projects, and you'll notice that blockchain projects absolutely dominate the list.

   Understand the difference between IDO vs. IEO vs. ICO
   https://phemex.com/blogs/what-is-a-dex-ido

   Also check these links for latest listings:

ICO list at ICO Drops https://icodrops.com

ICO List of Best New Initial Coin Offerings https://topicolist.com/

Top-Rated Crypto Token Sales: List of New ICOs, STOs, IEOs and IDOsTop-Rated Crypto Token Sales: List of New ICOs, STOs, IEOs and IDOs https://cryptototem.com/ico-list/

ICO List Online https://www.icolistingonline.com

Binance IEO List https://coincodex.com/ieo-list/binance/

Binance Launchpad https://www.coinspeaker.com/ieo/platform/binance-launchpad/

IEO List https://icomarks.com/ieo

Polkastarter https://polkastarter.com

Project Part 1: How to Launch a IEO on Binance Launchpad

Read How to Launch an IEO https://appinventiv.com/blog/how-to-launch-an-ieo/

Your first task of the project is to make a google slides presentation on how to start a IEO on the Binance Launch Pad https://www.binance.com/en/support/faq/94ed108ce89d44ab8602aa3c476dfb04

Note: Also document the alternatives to Binance Launchpad.

Project Part 2: How to Launch a IDO on Polkastarter

Review the [list of top fundraising platforms https://cryptorank.io/fundraising-platforms

Your second task of the project is to make a google slides presentation on how to start a IDO on the Polkastarter https://polkastarter.com/

Project Part 3: Create a Pako Token

By creating a token and related contracts, you'll also learn how to handle money sent to your contracts, which should come in handy if you want to create some kind of paid decentralized service in the future.

Therefore, for the sake of this chapter, let's imagine that our Pako DApp uses its own coin – the Pako Token. We will create two contracts – one for the token itself and one for the token crowd sale (the ICO).

Now Create your own Pako ERC20 Token and deploy it on a testnet. The Token should be to use OpenZeppelin contracts. You will use the Hardhat development environment. Also, write at least twenty automated tests. We will be using Solidity and Typescript for development.

Project Part 4: Develop Crowd Sale Contract

This contract will be responsible for allowing users to exchange ETH for our Pako Token. In order to do that we need to set a price for our token (1 ETH = 100 Pako Token)

Implement a payable buyToken() function.

Emit a BuyTokens event that will log who's the buyer, the amount of ETH sent and the amount of Token bought

Transfer 75% of the Tokens to the Crowd Sale contract at deployment time. i.e. Right after the contract is deployed, we want the token contract to send 75% of our token supply to it. While 25% remain in our personal "owner" account.

Transfer the ownership of the Crowd Sale contract (at deploy time) to our frontend address so that we are able to withdraw the ETH.

You can use the openzeppelin crowd sale contracts https://docs.openzeppelin.com/contracts/4.x/crowdsales however you will have to update the code to the latest solidity version.

Also write extensive tests, for example we will simply send a transaction of 1 ETH from a random account to the contract. After the transaction, we should expect the account to have received Pako, while the contract's balance should have been reduced.

Note: Before you get started writing the token contract we suggest you review the access control https://docs.openzeppelin.com/contracts/4.x/access-control

Project Part 5: Trying it with MetaMask

While it's always good to test your code, it's often more satisfying to see the results of your work wrapped in a nice UI. Let's see how we can deploy our contracts and get some Pako tokens into our MetaMask wallet!

We start by running our deployment scripts for the test network so that the new token contracts are uploaded and deployed.

When it's done, take note of what addresses the contracts were uploaded to and copy it!

Now head to MetaMask, and send a transaction of 1 ETH to the crowd sale contract address. If your MetaMask wallet doesn't have any ethers, remember that you can use any faucet.

After the transaction has been confirmed, you might be confused about why you can't see any tokens in your wallet. It turns out that you need to manually add the token address in MetaMask in order to "register" it – after all, there are so many tokens out there, there's no way MetaMask could list them all by default!

To do this, open the side menu and click on the "Add token" button to get started:

Once you're on the token page, click on "Add custom token" and paste in the token contract's address in the address field.

After confirming that you want to add the token, you should be able to see your Pako balance right next to your ETH balance in the wallet. How cool!

Project Part 6: Trying it with Multisignature Wallets

Read
https://www.coindesk.com/tech/2020/11/10/multisignature-wallets-can-keep-your-coins-safer-if-you-use-them-right/

Now use Gnosis Safe]{https://gnosis-safe.io/ with multi-sigs to do what you did in the last part.

Project Part 7: Sending Tokens using Ethers.js

Write a Typescript program to send Pako Token to some friend's address using Ethers.js.

You may follow this tutorial
https://ethereum.org/en/developers/tutorials/send-token-etherjs/

Project Part 8 Advance: Create, Deploy, Mint, and Sell an NFT

Read this NFT tutorial series
https://ethereum.org/en/developers/tutorials/how-to-write-and-deploy-an-nft/

Create a NFT contract using the [OpenZepplen ERC721 NFT Standard
https://docs.openzeppelin.com/contracts/4.x/erc721

You may use the Preset ERC721 contract
https://docs.openzeppelin.com/contracts/4.x/erc721#Presets

Deploy your NFT contract on a testnet, mint it, and view it on the MetaMask wallet and list it on OpenSea Marketplace https://opensea.io/ for sale.

Implement a ERC721 Market
https://ethereum.org/en/developers/tutorials/how-to-implement-an-erc721-market/

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Quarter V

MV-361: Developing Planet-Scale Open Virtual and Augmented Metaverse Experiences

Duration: 13 Weeks

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Course Description:

The Web is the Metaverse. The metaverse requires an infrastructure that connects all of the metaverses so that we can travel between them. This is only achievable with open web-based metaverses. The internet and its browsers are magical. Federated but linked experiences connect pages, people, technology, businesses, standards, and nations. It's unlike anything else. The metaverse should replicate the best qualities of the web - it should just be the web. We just have to extend online responsive design from mobile to desktop to 3D, Augmented Reality, and Virtual Reality. This course will teach you how to build the Open Social Spatial Web with WebXR and WebGPU technologies.

Course Outline:

1. **Open Metaverse Web Development**

   Open Metaverse Learning Repo
   https://github.com/panaverse/metaverse-web

2. **Blender 3D asset Creation for the Metaverse (Remote Zoom Class)**

   Blender development is being funded by heavyweights in the real-time 3D (RT3D) space such as Apple, Unity, AMD, Intel, Meta, NVIDIA, AWS, Epic Games, Adobe, Microsoft, and Decentraland. It is expected to become the standard asset creation tool for metaverse.

   Blender 3.3+ Download https://www.blender.org/download/

   Blender 3.0 Beginner Tutorial
   https://www.youtube.com/playlist?list=PLjEaoINr3zgFX8ZsChQVQsuDSjEqdWMAD

   Blender 3.0 Hotkey
   https://docs.google.com/document/d/1zPBgZAdftWa6WVa7UIFUqW_7EcqOYE0X743RqFuJL3o/edit

   Blender Projects Textbook: Blender by Example 2nd Edition
   https://www.packtpub.com/product/blender-3d-by-example-second-edition/9781789612561

   Blender Textbook: The Complete Guide to Blender Graphics: Computer Modeling & Animation 7th Edition by John M. Blain
   https://www.amazon.com/Complete-Guide-Blender-Graphics-Animation/dp/103212167X/ref=sr_1_5

   Best Hardware Performance for Blender Rendering

https://www.youtube.com/watch?v=H7T0SzdFHwg

Assignment 1:

Build a 3D Donut using Blender 3 as shown in these video tutorials
https://www.youtube.com/playlist?list=PLjEaoINr3zgFX8ZsChQVQsuDSjEqdWMAD

Assignment 2:

Build a Viking Scene using Blender 3 as shown in chapter 2 of the Book [Blender by Example 2nd Edition
https://www.packtpub.com/product/blender-3d-by-example-second-edition/9781789612561

Assignment 3:

Modeling a Time Machine using Blender 3 as shown in chapters 3 and 4 of the Book Blender by Example 2nd Edition
https://www.packtpub.com/product/blender-3d-by-example-second-edition/9781789612561

Assignment 4:

Build a Modern Kitchen using Blender 3 as shown in chapters 5, 6, and 7 of the Book Blender by Example 2nd Edition
https://www.packtpub.com/product/blender-3d-by-example-second-edition/9781789612561

Assignment 5:

Illustrating an Alien Hero with Grease Pencil as shown in chapter 8 of the Book Blender by Example 2nd Edition
https://www.packtpub.com/product/blender-3d-by-example-second-edition/9781789612561

Assignment 6:

Build a 3D Sword in the Stone using Blender 3 as shown in these video tutorials
https://www.youtube.com/watch?v=bpvh-9H8S1g

Artificial Intelligence (AI) and Deep Learning Specialization

Quarter IV

AI-351: Developing Planet-Scale Intelligent APIs and Python Programming

Duration: 13 Weeks

Course Description:

Artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems. The AI and Deep Learning Specialization is a foundational program that will aid in your comprehension of deep learning's potential, difficulties, and effects as well as equip you to take part in the creation of cutting-edge AI technology.

We will start this course by understanding the fundamentals and use cases for AI and move on to building next-gen intelligent apps using OpenAI's powerful models and Next.js 13.

We'll conclude the course by learning about basic programming concepts using Python, such as lists, dictionaries, classes, functions, and loops, and practice writing clean and readable code with exercises for each topic. We'll also learn how to make your programs interactive and how to test your code safely before adding it to a project. It is a fast-paced, thorough introduction to programming with Python 3.10+ that will have you writing programs, solving problems, and making things that work in no time. In this quarter we will also learn Git, the distributed version control system. We will also review Git-based GitHub services.

Course Outline:

1. Introduction to Machine Learning, Data Science, and AI

   AI for Everyone
   https://www.coursera.org/learn/ai-for-everyone

   AI for Everyone Quiz in Week 3
   Total Questions: 60, Total Time: 75 minutes

2. Building Next-Gen Intelligent Apps with OpenAI's Powerful Models
   We will cover GPT-4, ChatGPT, etc. and Next.js 13
   https://openai.com/api/
   https://towardsdatascience.com/gpt-4-is-coming-soon-heres-what-we-know-about-it-64db058cfd45

3. Python Crash Course for TypeScript Developers

   Python Crash Course, 2nd Edition: A Hands-On, Project-Based Introduction to Programming 2nd Edition
   https://www.amazon.com/Python-Crash-Course-2nd-Edition/dp/1593279280/ref=sr_1_5

Quarter V

AI-361: Deep Learning and MLOps

Duration: 13 Weeks

Course Description:

This course will help you understand the capabilities, challenges, and consequences of deep learning and prepare you to participate in the development of leading-edge AI technology. We will finish the program by learning how to envision, create, and maintain integrated systems that run constantly in production. Production systems must manage constantly changing data, in stark contrast to typical machine learning modeling. The production system must also operate continuously at the lowest possible cost while delivering the highest possible performance.

Course Outline:

1. Deep Learning with Tensorflow

   Deep Learning with Python, Second Edition 2nd Edition
   https://www.amazon.com/Learning-Python-Second-Fran%C3%A7ois-Chollet/dp/1617296864/ref=sr_1_2

2. Machine Learning Engineering for Production (MLOps) using Terraform for CDK

   A Comprehensive Guide to MLOps Terraform: Infrastructure As Code(IaC)
   https://betterprogramming.pub/a-comprehensive-guide-to-mlops-infrastructure-as-code-iac-ef4c97742351

   MLOps leveraging AWS SageMaker and Terraform
   https://towardsdatascience.com/mlops-leveraging-aws-sagemaker-terraform-and-gitlab-e7d97eaa6dce

Cloud-Native Computing Specialization

Quarter IV

CN-351: Certified Kubernetes Application Developer (CKAD)

Duration: 13 Weeks

Course Description:

Cloud-native architecture and technologies are an approach to designing, constructing, and operating workloads that are built in the cloud and take full advantage of the cloud computing model. Cloud-native technologies empower organizations to build and run scalable applications in modern, dynamic environments such as public, private, and hybrid clouds. Containers, service meshes, microservices, immutable infrastructure, and declarative APIs exemplify this approach.

These techniques enable loosely coupled systems that are resilient, manageable, and observable. Combined with robust automation, they allow engineers to make high-impact changes frequently and predictably with minimal toil.

Kubernetes is an open-source system for automating the deployment, scaling, and management of containerized applications. In this course, you will learn how to develop cloud applications using cloud-native technologies like Containers, Kubernetes, and CDK for Kubernetes.

Course Outline:

1. Kubernetes: Up and Running: Dive into the Future of Infrastructure 3rd Edition
   https://www.amazon.com/Kubernetes-Running-Dive-Future-Infrastructure/dp/109811020X/ref=sr_1_3

2. Cloud Development Kit for Kubernetes
   https://cdk8s.io/

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Quarter V

CN-361: Developing Multi-Cloud Apps using CDK for Terraform

Duration: 13 Weeks

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Course Description:

Terraform lets you use the same workflow to manage multiple providers and handle cross-cloud dependencies. This simplifies management and orchestration for large-scale, multi-cloud infrastructures.

Cloud Development Kit for Terraform (CDKTF) allows you to use familiar programming languages to define and provision infrastructure. This gives you access to the entire Terraform ecosystem without learning HashiCorp Configuration Language (HCL) and lets you leverage the power of your existing toolchain for testing, dependency management, etc.

Course Outline:

CDK for Terraform
https://developer.hashicorp.com/terraform/cdktf

Ambient Computing and IoT Specialization

Quarter IV

AC-351: Ambient Computing with Voice Assistants and Matter Devices

Duration: 13 Weeks

Course Description:

Ambient computing, also commonly referred to as ubiquitous computing, is the concept of blending computing power into our everyday lives in a way that is embedded into our surroundings - invisible but useful. In a multi-device world, people don't want to spend their life fussing with technology. An ambient approach gets the tech out of your way so you can live your life while getting the help you need. It doesn't matter what device you're using, what context you're in, whether you're talking, typing, or tapping. The technology in your life works together seamlessly. Ambient computing uses all aspects of modern-day technology, including voice assistants, artificial intelligence, sensors, connectivity, cloud computing and more.

If you were thinking that the IoT and ambient computing sound a lot alike, you aren't wrong; the two concepts are intertwined. IoT refers to the vast array of devices that connect to the internet to optimize their functionality, like smart sensors and smart speakers: ambient computing builds on that. Ambient computing focuses on the interaction between these devices once they are connected.

Matter, the next-generation smart home standard, solves many smart home pain points while bringing all our IoT devices together. Some of the biggest tech companies are working together to make Matter a unified protocol for future smart homes. These companies include Apple, Amazon, and Google. This means Apple HomeKit, Amazon Alexa, Samsung SmartThings, Google Nest, and Samsung SmartThings will support the Matter standard by default for all new devices.

In this course we will learn to build smart homes with Amazon Alexa and Matter protocol.

Course Outline:

1. Alexa Skill Developement
   https://developer.amazon.com/en-US/alexa

2. Alexa with Matter Protocol
   https://developer.amazon.com/en-US/alexa/matter

   https://developer.amazon.com/en-US/blogs/alexa/device-makers/2022/07/alexa-live-2022-ack-sdk-matter.html

Quarter V

AC-361: Embedded Programming using C and Rust

Duration: 13 Weeks

Course Description:

This is an introductory course about using the C and Rust Programming Languages on "Bare Metal" embedded systems, such as Microcontrollers. We will start by introducing embedded systems and move on to learn the C++ and Rust programming languages. We'll learn about basic programming concepts using C and Rust, then we will explore key concepts in electronics, microcontrollers, and embedded programming. It is a fast-paced, thorough introduction to programming with C and Rust that will have you writing programs, solving problems, burning your code on microcontrollers, playing with GPIOs, and making things that work in no time.

Course Outline:

1. **Introduction to the Internet of Things and Embedded Systems** (Weeks 1 and 2)
   https://docs.google.com/presentation/d/14OcW4HfS2i1Db1uKOU6SrckFEFjhSLMgfnHY B3XlEZo/edit?usp=shar ing
   What is the Fourth Industrial Revolution?
   What is IoT?
   Embedded Systems
   Hardware and Software for IoT
   Edge and Cloud Computing
   The future of IoT is AI
   Blockchain in the Internet of Things?
   IoT + AI + Blockchain: The Fourth Industrial Revolution has begun
   How will Matter change the IoT Infrastructure and address issues
   Metaverse and IoT

   Mid-Term I: Introduction to the Internet of Things (IoT) Quiz in Week 3
   Total Questions: 46, Total Time: 60 minutes

2. The C Reference Book: The C programming language
   Embedded Programming book: Internet of things with ESP8266

   Download Link:
   https://drive.google.com/drive/folders/1CZFxLSFoo9rl3le7KRuhUwLEV6h4xLXN?usp=sharing

3. **Introduction to C Part 1** (Weeks 3B, 4, and 5)

   C environment Setup for (Windows, Linux, and Mac OS systems)
   Chapters 1-2 of **"The C programming language"**
   - Variable names types
   - Data types and sizes
   - Constants
   - Arithmetic operations
   - Logical and relational operators
   - Type conversions.

- Bitwise operators
- Conditional expressions.

Programming Assignments will also be given.

4. C Programming Part 2 (Weeks 6 and 7)
Topics 3 and 4 of **"The C programming language"**
- Control flow statements (else if, loops, switch, break continue)
- Function and Program structure(Returning and non-returning, scope rules, Recursion)

Programming Assignments will also be given.

5. Introduction to Embedded systems Part 1 (Weeks 8)

Basic Electronics and Introduction to microcontrollers
Chapter 1 of **"Internet of things with ESP8266"**
- Arduino IDE installation and env setup for ESP8266
- Burning your first code on ESP8266

Project-based Assignments will also be given.

Mid-Term II: C Programming Quiz 1 in Week 9
Total Questions: 62, Total Time: 75 minutes

6. Introduction to Embedded systems Part 2 (Weeks 9-12)
Chapters 2-5 of **"Internet of things with ESP8266"**
- Connecting your hardware to wifi.
- https://randomnerdtutorials.com/wifimanager-with-esp8266-autoconnect-custom-parameter-and-manage-your-ssid-and-password/
- Reading data from GPIOs.
- https://randomnerdtutorials.com/esp8266-nodemcu-digital-inputs-outputs-arduino/#:~:text=ESP8266%20NodeMCU%20Read%20Digital%20Inputs,number)%20you%20are%20referring%20to.
- Controlling LEDs.
- Reading data from digital sensors.
- https://randomnerdtutorials.com/esp32-dht11-dht22-temperature-humidity-sensor-arduino-ide/
- Cloud data logging.
- https://tttapa.github.io/ESP8266/Chap16%20-%20Data%20Logging.html
- https://circuitdigest.com/microcontroller-projects/nodemcu-datalogger-to-save-temperature-and-pressure-data-on-thinger-io-cloud-platform
- https://iotdesignpro.com/projects/nodemcu-data-logger-to-upload-data-on-webserver

- Displaying data on the cloud.
- https://github.com/adesolasamuel/NodeMCU-DHT-Data-to-Arduino-IoT-Cloud
- Controlling controller remotely.
- https://www.instructables.com/Control-ESP8266-Over-the-Internet-from-Anywhere/
- Controlling a lamp anywhere in the world.
- Interacting with different web services.

4. Embedded Programming using Rust (Extra Weeks in the Course)
   https://www.rust-lang.org/what/embedded
   https://crates.io/crates/esp8266

5. Hardware Requirements:
   a. Esp8266 (Node MCU)
   b. Jumper Wires
   c. Bread Board
   d. LEDs
   e. Sensors: (Dht11, ultrasonic sensor, IR sensor)

Genomics, Bioinformatics with Generative AI Specialization

Quarter IV

Bio-351: Python for Biologists

Duration: 13 Weeks

Course Description:

This course will focus on learning the basics of the Python programming language through genomics examples.

Textbook: https://www.pythonforbiologists.org/

Quarter V

Bio-361: Bioinformatics with Python

Duration: 13 Weeks

Course Description:

In this course we will discover modern, next-generation sequencing libraries from the powerful Python ecosystem to perform cutting-edge research and analyze large amounts of biological data.

Textbook:
https://www.amazon.com/Bioinformatics-Python-Cookbook-applications-computational/dp/1803236426/ref=sr_1_1

Quarter VI

GAI-371: Generative AI in Biology and Healthcare

Duration: 13 Weeks

We will focus on Generative AI:

Generative AI in Biology and Healthcare:
https://youtu.be/NHszJiL-9pM

Accelerate AI-Powered Drug Discovery With NVIDIA BioNeMo
https://www.youtube.com/watch?v=GNL1z7hnj4w

Generative AI is dreaming up new proteins
https://cen.acs.org/physical-chemistry/protein-folding/Generative-AI-dreaming-new-proteins/101/i12

Network Programmability and Automation Specialization

Quarter IV

NPA-351: CCNA 200-301 Certification

Duration: 13 Weeks

Course Description:

This course will focus on learning the basics of the networking and preparing for the new Cisco Certified Network Associate (CCNA) exam. This comprehensive course focuses on the solutions and technologies needed to implement and administer a broad range of modern networking and IT infrastructure.

Textbook:
https://www.amazon.com/CCNA-200-301-Official-Guide-Library/dp/1587147149/ref=sr_1_1

Quarter V

NPA-361: Network Programmability and Automation

Duration: 13 Weeks

Course Description:

Traditional network management techniques can't be effectively automated and don't scale well. By implementing network programmability based on Application Programming Interfaces, this course will assist in overcoming issues of the future and help you develop the skills required for the Next-Generation Network Engineer.

Textbook:
https://www.amazon.com/Network-Programmability-Automation-Networking-Technology/dp/1587145146/ref=sr_1_3