



20 TRAINING APPROACH AND METHODOLOGY

The Pakistan MoIT is looking to partner with experienced technology education operators to create training programs to train the future of technical talent in Pakistan and enhance technical skills to match international standards and demands. The future graduates of these programs in Cloud Native Development, Data Science/AI/ML, Cybersecurity, and Blockchain will go on to compete for highly paid jobs offered by international firms who will therefore be more likely to expand their operations in Pakistan and bring new business to the country.

InfoTech and Vasona Systems International (VSi) has subcontracted Emeritus Institute of Management on this critical upskilling initiative. At Emeritus, it is believed that education has the power to fundamentally change the future of humanity. Talent and ability exist everywhere; but equal access to opportunity does not. Emeritus is on a mission to change that by making the highest-quality education accessible and affordable to individuals, companies, and governments around the world – especially education that translates directly into marketable skill sets that lead to employment.

Over the past decade, Emeritus have realized this goal by collaborating with more than 50 top-tier universities across the United States, Europe, Latin America, Southeast Asia, India and China. Short courses, degree programs, bootcamps, and senior executive programs help individuals learn new skills and transform their lives, companies and organizations.

Emeritus also recognize that traditional education, as well as modern self-paced education options, are not a great fit for many of today's learners. That's why Emeritus piloted the development of the Small Private Online Cohort, a learning model that is optimized for how adults learn. Students are given the flexibility to spend time with high-quality content, learning at the pace that works best for them – while also having an environment of peer support, interactivity, hands-on project work, career counseling, and live mentoring and coaching with expert course leaders.

The results of this model are evident in course completion rates of over 90% for Emeritus' professional learners. This unique model of state-of-the-art technology, curriculum innovation, and hands-on instruction from senior faculty, mentors and coaches has educated more than 250,000 individuals across 80 countries.

Emeritus' course leaders and curriculum designers have deep technical expertise in Data Science, Software Engineering, Cybersecurity, and Blockchain, and have built out our extensive and proprietary curriculum that teaches cutting-edge technologies and industry best practices.

20.1 TRAINING APPROACH

Emeritus' educational programs are tailored to meet the needs and business objectives of our clients. We provide educational training and human capital solutions that deliver real-world business value. The programs below have been prepared based on the needs outlined in the MoIT RfP.

Please note that all of the outlined trainings below may be customized further to meet the MoIT's educational goals.



In the following pages you will see:

- Suggested course outlines for Blockchain Technology
- Emeritus Pedagogy, Instruction Format, and Curriculum
- Program timeline
- How will we setup the training program for success, including assessments, pre-course work and tracking success
- Delivery Methodology

20.1.1 BLOCKCHAIN TECHNOLOGY

Specific learning objectives and technology stack will be established when Emeritus conducts a requirements inception on the engaging organization's environment.

Goal:

The goal of this training is to provide students with skills necessary to join a blockchain smart contract community of practice as an entry level individual contributor.

Duration:

12 weeks, full time. Each week students would be expected to read material, take part in the lecture and complete hands-on projects that derive from work in the lectures and reading materials.

Course overview:

Students will be exposed to a breadth of blockchain and Web3 technologies including the blockchain architectural pattern, Bitcoin basics, Ethereum coin and smart contract development, and Hyperledger smart contract development along with the development tools and industry best practices necessary to develop decentralized applications using these technologies. The course itself is a mix of expert instructor-led lectures and instructor-coached hands-on activities.

20.1.1.1 PRE-REQUISITES

Students should have a degree in computer science which includes programming experience with JavaScript and preferably some exposure to front end development with React.

20.1.1.2 WEEKLY COURSE WORK SCHEDULE

Week 1:

Introduction to Blockchain - This module provides a history of blockchain technology, introduces decentralized networks, consensus protocols, transaction processing, finality and how these concepts apply to Ethereum and Hyperledger specifically.

Section 1: Ethereum Smart Contracts

Week 2:

Decentralized Applications - Next students learn the difference between tokens(ERC-20 & ERC-721), determining how to establish if blockchain is the appropriate architecture for your application, and key non-functional requirements of DApps (verifiability, transparency, resilience, etc.).



Setting Up Your Toolstack for Ethereum - This unit introduces the toolstack you will use for writing smart contracts with Ethereum. Students will learn to install Parity, MetaMask, Node.js, and the Truffle Suite.

Week 3:

Building Your First Ethereum Contract - During this module students will build a “Hello World” greeter application using Truffle. Students will learn how to make their contract both dynamic and ownable and will experiment with executing it locally using Ganache.

Deploying Your Contracts - Students will compile and deploy the greeter contract they developed in the prior lesson to Goerli with Parity and to Rinkeby with Infura.

Week 4:

Building a Production Scale Distributed Application - This week will be focused on building a production scale application that allows users to run fundraising campaigns that allow people to make ETH donations to their favorite causes. In addition to building the fundraiser contract, students will also learn how to use the factory pattern to generate new fundraiser contracts. This unit explores more complex data structures and logic patterns and applies Ethereum development to a real world use case.

Introduction to Web3 - This unit compares web 2.0 architecture with blockchain based Web3 application structures and explains the improvements and advantages that come with the Web3 architecture. Web3 is also a collection of javascript libraries that allow developers to interact with Ethereum nodes using JSON RPC. The basics of these libraries is presented as an overview as well.

Week 5:

Building a React UI - This unit focuses on building a React UI using React Truffle Box. Students will learn how to connect their simple React UI with a smart contract using Web3 libraries in order to realize an end-to-end Web3 architecture. MetaMask tooling is also explored.

Building Robust Front Ends - This unit dives deeper into React concepts in order to build a more complex front end for the fundraiser contract that was developed earlier in the course. By the end of this unit students will have built a production scale DApp that would be suitable for deployment on the Ethereum mainnet.

Week 6:

A Word on Security - Security is of utmost importance in the unregulated and automated world of Web3. Blockchain based applications operate at high speeds without direct administrator oversight and frequently deal in transactions that involve currency with real world value. Security audits and careful testing are key to success with your DApps. This module looks at how to prepare for an audit and how to build your own auditing skills to ensure your applications run as expected.



Section 2: Hyperledger Smart Contracts

Introducing Hyperledger Fabric v2 - Now that students have a clear understanding of Ethereum contracts they can compare the features that are available with Hyperledger Fabric. This unit also provides a look at the Fabric architecture and components.

Week 7:

Setting Up Your Toolstack for Hyperledger Development - Students will work through the installation and configuration of the core tools needed for development of Hyperledger Fabric smart contracts. Students will set up a docker based Fabric test network locally along with Go, JQ and the fabric samples needed for the course. Students will clone an application from GitHub and get it running locally by the end of the lesson.

Writing Your First Chaincode - During this lesson students will build their first chaincode and deploy it locally on a blockchain network. The differences between golang and Node.js SDKs are reviewed as are the basic development workflow.

Week 8:

Testing and Maintaining Chaincode - Strategies for unit testing contracts is explored in this unit including testing and debugging tools and frameworks. Troubleshooting and log analysis are also covered.

DApp Project with Hyperledger Fabric - This module dives into building a full end to end supply chain DApp using Hyperledger Fabric. Students will build a full application including a front end and related contracts.

Cloud Deployment - This unit focuses on deploying the DApp from the prior lesson to Amazon Blockchain Services. Provisioning, configuration and deployment of Fabric contracts and DApps to the Amazon ecosystem are explored in detail.