Professional Master's Degree
Blockchain Programming

tech global university

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Professional Master's Degree
Blockchain Programming

- Modality: **online**
- Duration: **12 months**
- Certificate: **TECH Global University**
- Credits: **60 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

Website: www.techtitute.com/us/information-technology/professional-master-degree/master-blockchain-programming

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01

Introduction

The development of the microprocessor. The creation of the World Wide Web. The popularization of the Internet. These are just some examples of technological milestones that have transformed the world, improving the lives of billions of people. **Blockchain** technology is the next revolution, as it will be in a short period of time a fundamental tool to perform numerous operations and transactions. There is no large company today that is not directing all its efforts to strengthen its technological area by investing in it For that reason, this program offers computer scientists the possibility to study this subject in depth, so that they can reach great professional opportunities and explore new business avenues such as cryptocurrencies, thanks to all the potential offered by this field.

Enroll now and delve into today's most important technology sector. You will get to work for giants like Microsoft, IBM or VISA developing the most innovative Blockchain projects"

The third technological revolution has brought with it a great number of advances that have improved the quality of life of billions of people and have led to the improvement of a series of essential processes in contemporary life. As such, tasks that, just a few years ago, were performed in person, are now done exclusively in the digital environment, such as purchases, bureaucratic procedures, communications, etc., new technologies have made it possible that presence is no longer necessary in many areas.

At this juncture, cryptocurrencies emerged and, associated with them, the Blockchain, which consists of a chained data structure that records all kinds of information, often economic transactions, in a transparent, secure and immutable way. Among its existing particularities, it is possible to highlight the possibility of validating operations without the need for the intervention of a third party, as in the case of banking transactions, which requires these institutions to approve them, without the process being visible to their clients and users.

In addition, the Blockchain has begun to have numerous applications beyond the purely economic. For example, it is used in distributed data storage in the cloud, in data logging and verification, which is very useful in public and healthcare environments, or in the monitoring of a supply chain, among many other elements. In this way, it is a technology that has unlimited possibilities, which is why it represents a great revolution at present. Thereby, the new big job orientation for developers, programmers and engineers is the Blockchain and everything around it.

This Professional Master's Degree prepares computer scientists to study this discipline in depth, so that they can take advantage of the numerous opportunities, both professional and entrepreneurial, offered by the Blockchain and cryptocurrencies. To this end, it prepares them to explore issues such as Ethereum and public Blockchains, sovereign digital identity or the use of the Blockchain in NFT and DeFi, among many others. It does so by employing an innovative 100% online teaching methodology that adapts to the circumstances of each student, composed of multimedia content such as case studies, interactive summaries, master classes and testing and retesting exercises, among many others.

This **Professional Master's Degree in Blockchain Programming** contains the most complete and up-to-date educational program on the market. Its most notable features are:

- The development of case studies presented by Blockchain experts.
- The graphic, schematic and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional practice
- Practical exercises where the self-assessment process can be carried out to improve learning
- Its special emphasis on innovative methodologies in Advanced Practice Nursing
- Theoretical lessons, questions to the expert, debate forums on controversial topics, and individual reflection work.
- Content that is accessible from any fixed or portable device with an Internet connection

Blockchain has already transformed the world: don't miss the boat and specialize in the technological tool of the future"

This program will give you the opportunity to study Blockchain Programming and its practical applications in depth, in areas such as healthcare or logistics"

Advance professionally or become an entrepreneur thanks to everything you will learn about Blockchain in this Professional Master's Degree.

Big tech companies are looking for Blockchain programming experts: don't keep them waiting.

The program's teaching staff includes professionals from the sector who contribute their work experience to this training program, as well as renowned specialists from leading societies and prestigious universities.

The multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide immersive specialization programmed to learn in real situations.

This program is designed around Problem-Based Learning, whereby the professional must try to solve the different professional practice situations that arise throughout the program. This will be done with the help of an innovative system of interactive videos made by renowned experts.

02

Objectives

The objective of this Professional Master's Degree in Blockchain Programming is to study this technological sector that is so important nowadays, in order to provide the student with the best tools to progress professionally. Therefore, with this program, computer scientists will be able to go even further in their specialization in this field, preparing themselves, in passing, to face the near future of the IT field with the greatest guarantees, in which Blockchain will be a fundamental element.

Become a great Blockchain specialist thanks to this Professional Master's Degree"

General Objectives

- Draw conclusions regarding good security practices
- Consider the vulnerabilities associated with Blockchain
- Analyze the future impact of running public Blockchains
- Develop design criteria for applications on production Hyperledger Besu clients
- Provide a foundation in the management and configuration of Hyperledger Besu-based networks
- Promote best practices when developing applications with dependency on Blockchain networks, particularly those based on Ethereum and on Hyperledger Besu client
- Integrate the student's existing knowledge in a refined way based on the needs of industry and business with their notions of quality, effort measurement and development valuation, expanding their value as a Blockchain application developer
- Generate specialized knowledge about what Hyperledger Fabric encompasses and how it works
- Examine the resources that Hyperledger provides free of charge
- Analyze the features of Hyperledger Fabric
- Develop Fabric's current main application case studies
- Determine what Open Finance is
- Examine the characteristics of NFT
- Analyze the evolution of the crypto world up to today
- Identify the regulations applicable to the different business models offered by technology
- Establish the basics of knowledge of the crypto world and its key aspects
- Identify potential legal risks in real projects
- Determine the logistic processes to define the main needs and gaps of the current logistic process
- Demonstrate the potential of the technology and validate that the solution fits the need
- Implement the solution in phases so that value can be extracted from the beginning of the project and can be adjusted as use and learning occur
- Analyze why or why not to apply a Blockchain solution in our environment
- Generate specialized knowledge on the logical concept of distributed technologies as a comparative advantage

Specific Objectives

Module 1. Blockchain Technology: Technologies Involved and Cyberspace Security

- Establish methodologies for information analysis and deception detection on the Internet
- Plan an Internet search strategy
- Determine the most appropriate tools to detect a criminal act on the Internet
- Deploy an environment with the following tools: Logstash, Elasticsearch and Kibana
- Address the risks faced by analysts in a research exercise
- Conduct research processes based on wallet or address availability
- Identify possible indications of mixers being used to blur transaction trails

Module 2. Public Blockchain Development: Ethereum, Stellar and Polkadot

- Broaden skills in the world of Blockchain development
- Develop practical examples based on cases
- Compile generic knowledge about blockchains in practice
- Analyze the operation of a public Blockchain
- Gain experience in Solidity
- Establish a relationship between the different public Blockchains
- Create a project on a public Blockchain

Module 3. Corporate Blockchain Development: *Hyperledger Besu*

- Identify key configuration points in the consensus protocols available with Hyperledger Besu
- Right-sizing a Hyperledger Besu service to support enterprise applications
- Develop automated test protocols for quality validation in Hyperledger Besu environments
- Establish safety criteria for a production environment with Hyperledger Besu
- Compile the different types of configurations on Hyperledger Besu clients
- Determining the sizing criteria for an application with Hyperledger Besu
- Strengthen knowledge of the functioning of the consensus mechanisms implemented in Hyperledger Besu
- Define the most interesting technological Stack in the implementation of infrastructure and development of applications based on Hyperledger Besu

Module 4. Corporate Blockchain Development: *Hyperledger Fabric*

- Generate specialized knowledge about Hyperledger and Fabric
- Analyze what can be done with this technology
- Determine the inner workings of transactions
- Solve a problem with Fabric
- Deploy Fabric
- Gain experience in Fabric deployments

Module 5. Sovereign Identity Based on Blockchain

- Analyze the different Blockchain technologies that enable the development of Digital Identity models
- Analyze self-sovereign digital identity proposals
- Assess the impact on public administration of implementing self-sovereign digital identity models
- Foundations for developing Blockchain-based Digital Identity solutions
- Generate specialized knowledge on Digital Identity
- Analyze what can be done with this technology
- Determine the inner workings of identities in Blockchain

Module 6. Blockchain and its New Applications: DeFi and NFT

- Evaluate the importance of Stablecoins
- Examine Maker, Augur and Gnosis protocol
- Determine the AAVe protocol
- Identify the importance of Uniswap
- Study the Sushiswap philosophy in depth
- Analyze dY/dX and Synthetix
- Identifying the best markets for NFT exchange

Module 7. Blockchain. Legal Implications

- Generate specialized knowledge on the Whitepaper concept
- Determining the legal requirements for cryptoassets
- Establish the legal implications in the regulation of cryptocurrencies
- Developing the regulation of tokens and ICOs
- Contrast and compare the current regulations against the EIDAS regulations
- Examine the current regulation of NFTs

Module 8. Blockchain Architecture Design

- Develop the foundations of the architecture
- Generate specialized knowledge in Blockchain networks
- Evaluating stakeholders
- Determine infrastructure requirements
- Identify deployment options
- Program for production start-up training

Module 9. Blockchain Applied to Logistics

- Examine the operational and systemic reality of the company to understand the needs for improvements and future solution with the Blockchain
- Identify the To Be model with the solution best suited to the company's needs and challenges
- Analyze a Business Case with a plan and macro solution agreement for executive approval
- Demonstrate the potential and scope of the application and its benefits by means of a POC for operational approval
- Establish a project plan with the Owner and Stackholders to start work on functional definition and prioritization of Sprints
- Develop the solution according to the user stories to initiate testing and validation to go into production
- Carry out a concrete Change Management and Blockchain implementation plan to bring the whole team to a new digital mindset and a more collaborative culture

Module 10. Blockchain and Business

- Analyze why we should or should not implement a Blockchain project in our environment
- Examine the challenges we face when implementing a product based on DLT technology
- Adapt knowledge and mental tools to understand the project-oriented Blockchain concept
- Gather all the possibilities offered by the vast blockchain universe, distributed, DeFi, etc
- Determine when a blockchain project is right or wrong
- Discern between a meaningful project and the Hype surrounding this technology

"This is the program you needed to learn about all the new developments in Blockchain"

03

Skills

This program is focused on the acquisition of new skills in the field of Blockchain Programming, so that at the end of the program, the computer scientist will have the most innovative tools and knowledge on issues such as Hyperledger Fabric, Hyperledger Besu or Blockchain architecture As such, they will be in a position to undertake projects in this area or join the best technology companies in the world thanks to everything they will have learned in the development of this Professional Master's Degree.

New skills and knowledge in Blockchain will make you a great expert sought after by the world's top tech companies"

General Skills

- Determine the extent to which information can be collected from Wallets that are physically available and the extent to which information can be collected only when an address is held
- Facing the deployment of a Hyperledger Fabric project
- Assess the impact on data privacy and security that current digital identity models present.
- Identify the benefits of using Blockchain technology for the deployment of digital identity-based solutions
- Analyze the different DeFI tools
- Evaluate new forms of passive income
- Examine the main advantages for citizens of implementing self-sovereign digital identity models
- Compile use cases in which Blockchain-based Digital Identity Models are transforming organizations' processes

Specific Skills

- Generate specialized knowledge about Ethereum as a public Blockchain
- Master the Stellar platform
- Specializing in Polkadot and Substrate
- Determining the right Blockchain network
- Achieve a secure, stable and scalable Blockchain network
- Establish the best solution and applicability of the Blockchain or the need of the company and all participants
- Explore the capability of certain Blockchain implementations and their impact on the financial and pharmaceutical field
- Analyze the best way to implement a Blockchain process focusing on the basics of the technology

These skills will prepare you for the present and future of IT"

04

Course Management

This Professional Master's Degree has the best faculty in the Blockchain field.. The teachers are active professionals who know this technological area to perfection and will transmit to their students all the keys to succeed in the sector, either as specialists in a large company or as founders and entrepreneurs in an innovative project that uses the Blockchain as a central element of its development.

The leading experts in Blockchain will transmit all their knowledge to help you succeed in the sector"

International Guest Director

Chris Sutton is a leading professional with extensive experience in the field of technology and finance, specializing in the Blockchain area. In fact, he has held the senior position of Director of the Blockchain and Digital Assets Department at Mastercard. In addition, he has been the Founder of the consulting firm N17 Capital, in which he offers advice to companies in the field of Blockchain and digital assets. So, one of his functions has been to identify the components that make up these new tools, analyze them and create working strategies.

His professional experience has included high-level roles in leading companies in the sector, such as Oasis Pro Market, where he has performed duties as Director of Blockchain Services. In addition, he has worked as Mergers and Acquisitions Product Manager at Cisco, and as Product Manager at IBM. These positions have allowed him to stand out internationally for his ability to lead teams, develop innovative strategies and manage large-scale projects.

Throughout his career, he has participated in important technological and financial events. In this sense, Chris Sutton has given presentations and has been part of international panels, along with other leading experts in this sector. In this way, on the occasion of the 15th anniversary of the white paper on Bitcoin, he participated in the events of the FinTech week in Hong Kong. He also presented his expertise at a conference organized by Mastercard in Dubai on banking in the digital age and the impact of digital assets. Likewise, his analyses have focused on delving into the history, principles and future of the Blockchain.

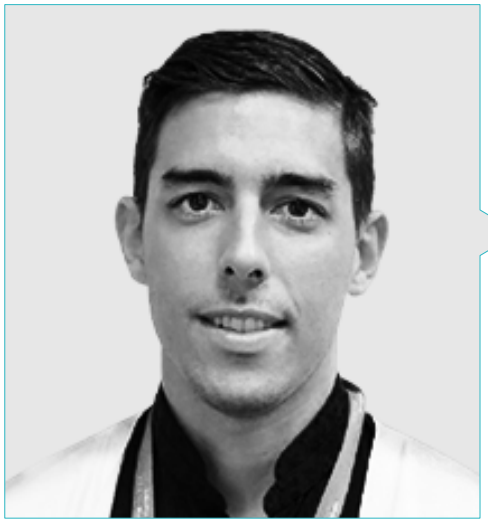
In short, his strategic vision and outstanding skills in programming and algorithms have been key to his success in the international market, consolidating him as a leader in his field.

D. Sutton, Chris

- Director of Blockchain and Digital Assets at Mastercard, Miami, U.S.A.
- Founder of N17 Capital
- Director of Blockchain Services at Oasis Pro Market
- Mergers and Acquisitions Product Manager at Cisco
- Product Manager at IBM
- Contributor at Cointelegraph
- Master's degree in Financial Systems Engineering from University College London
- Bachelor's Degree in Computer Science from Florida International University

Thanks to TECH, you will be able to learn with the best professionals in the world"

Management



Mr. Torres Palomino, Sergio

- Blockchain Architect Telefónica
- Blockchain Architect Signeblock
- Blockchain Developer Blocknitive
- Big Data Engineer Golive Services
- Big Data Engineer IECISA
- Degree in Computer Engineering from San Pablo CEU University
- Master's Degree in Big Data Architecture
- Master's Degree in Big Data and Business Analytics

Professors

Mr. Callejo, Carlos

- Academic Director for 5 editions of the Master's Degree in Applied Blockchain at UEMC and UCAM.
- CEO Block Impulse
- CTO Stocken Capital
- Master in Applied Blockchain
- FP2 Information Systems and Telecommunications
- Co-author of the book Cryptocurrencies For Dummies
- Trainer in the infoproduct Cryptocurrencies for everyone Plus

Mr. Herencia, Jesús

- Blockchain and DLT Consultant
- IT Director in Banking (Credit Agricole)
- Diploma in Computer Systems Engineering UPM
- Co-Director of Blockchain Specialist Course at the School of Legal Practice at UCM
- Lecturer at EAE on Cryptoassets and Blockchain

Ms. Carrascosa, Cristina

- Lawyer and Managing Partner of ATH21
- Cuatrecasas Law Firm
- Broseta Law Firm
- Despacho Pinsent Masons
- Degree in Law from the University of Valencia
- Master's Degree in Business Consulting from IE Law School and Master's Degree in Taxation and Taxation from CEF.
- Director of the Blockchain Program at IE Law School
- Co-author of Blockchain: the industrial revolution of the internet.

Mr. Olalla Bonal, Martín

- Client Technical Specialist Blockchain in IBM
- Blockchain Technical Specialist at IBM SPGI
- Director of Architecture. Blocknitive
- Digital Electronics Technician
- Arquitecto de Blockchain - Arquitecto de Infraestructura IT - Gestor de proyectos IT. Business areas: Software, Infrastructure, Telecommunications

Mr. Vaño Francés, Juan Francisco

- Solidity Engineer at Vivatopia
- Computer Science Engineer at the Polytechnic University of Valencia.
- Senior Computer Technician at R. Belda Lloréns
- Data Science Tools Course
- Specialized in DApp programming and Smart Contract development with Solidity

Mr. de Araujo, Rubens Thiago

- Program/Project Manager IT Blockchain para Supply Chain en Telefónica Global Technology
- Logistics Innovation and Projects Manager at Telefónica Brazil
- Graduate in Technological Logistics and Master in PMI Project Management from SENAC University (Brazil).
- Master's Degree in PMI Project Management from SENAC University (Brazil).
- Graduate in Technological Logistics from SENAC University (Brazil).
- Lecturer in Internal Training Leadership at Telefónica Brazil for Supply Chain Training and the use of new technologies "Logistics 4.0".
- Instructor and Multiplier of internal mini-courses of Change Management in Integrated Logistics

Mr. García de la Mata, Íñigo

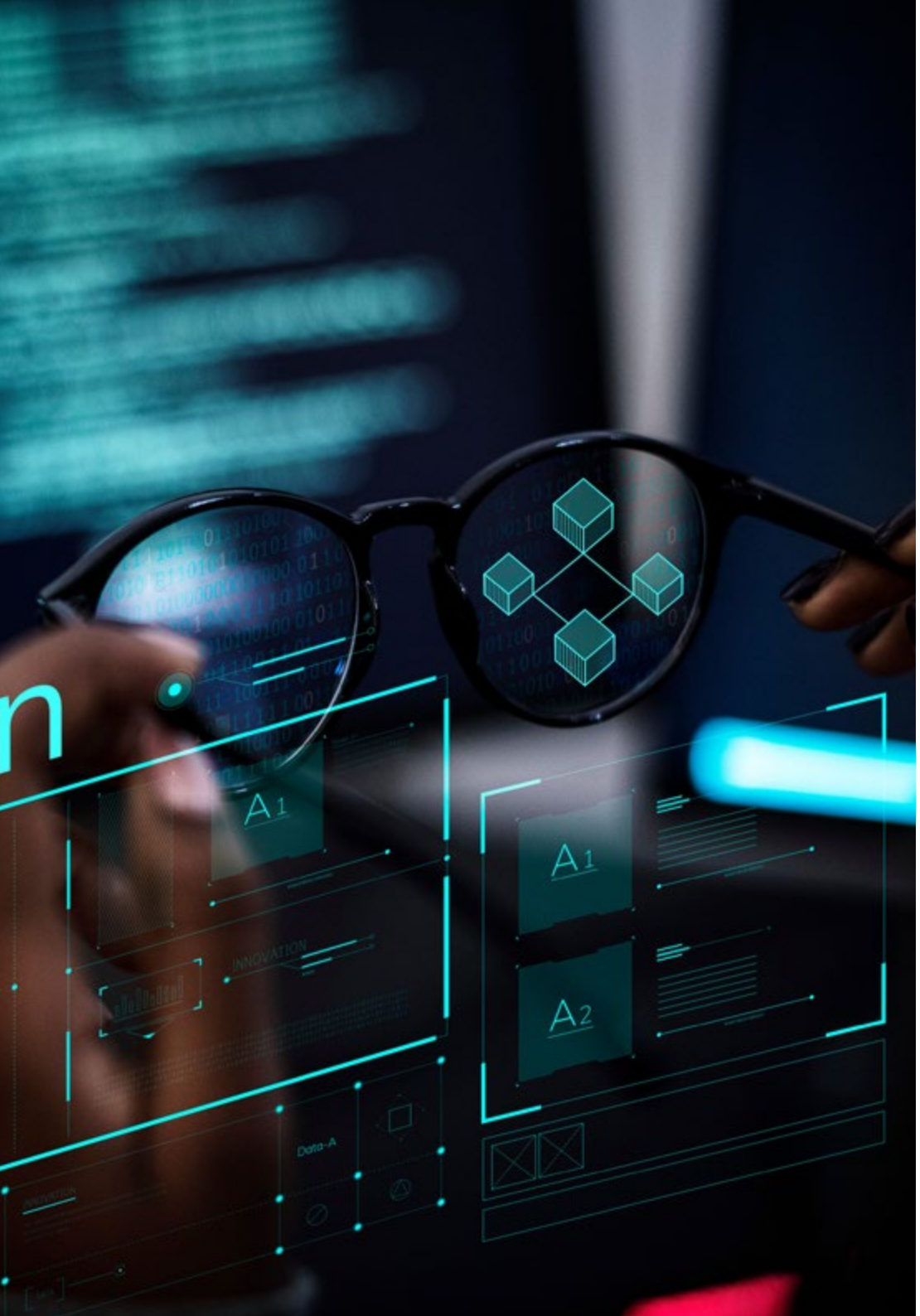
- Architecture Leader at Grant Thornton, Innovation Department
- Bachelor's Degree in Industrial Engineering with a Major in Electronics
- Industrial Engineering, Master's Degree in Electronics from Universidad Pontificia de Comillas
- Degree in Computer Engineering from UNED
- Lecturer in Blockchain University courses

Ms. Foncuberta Marina

- Lawyer ATH21, Blockchain, Cybersecurity, IT, Privacy and Data Protection.
- Attorney Pinsent Masons, Blockchain Cybersecurity, IT, Privacy and Data Protection Department.
- Lawyer as part of the Secondment Program, Technology, Privacy and Data Protection Department, Wizink
- Lawyer as part of the Secondment Program, Cybersecurity, IT, Privacy and Data Protection Department, IBM.
- Law Degree and Postgraduate Certificate in Business Studies from the Universidad Pontifica Comillas
- Master's Degree in Intellectual and Industrial Property, Universidad Pontificia Comillas (ICADE), Madrid
- Program on Law and Blockchain: "Blockchain: Legal Implications".
- Professor at San Pablo CEU University: subject "Law and new technologies: Blockchain"

Ms. Salgado Iturrino, María

- Blockchain Manager Iberia & LATAM Inetum
- Identity Comission Core Team Leader Alastria
- Conwet Research Lab. niversidad Politécnica de Madrid
- Software Developer Internship Indra
- Professor of Blockchain Applied to Business Polytechnic University of Madrid
- Degree in Software Engineering from the Complutense University of Madrid (UCM)
- Master's Degree in Computer Engineering from the Polytechnic University of Madrid (UPM)



Mr. Triguero Tirado, Enrique

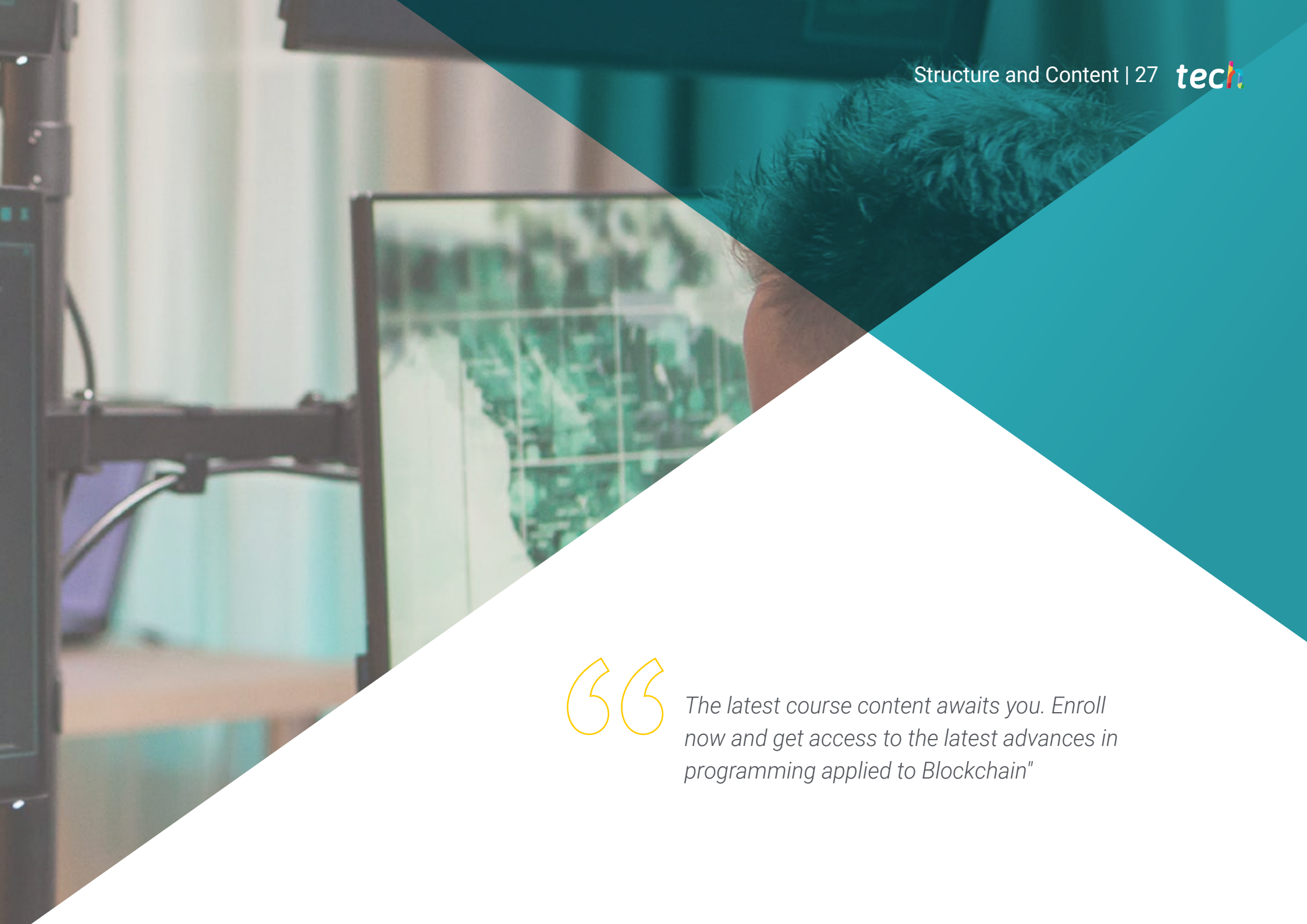
- Blockchain Infrastructure Technical Manager at UPC-Threepoints
- Chief Technical Officer at Ilusiak
- Project Management Officer at Ilusiak and Deloitte
- ELK Engineer at Everis
- Systems Architect at Everis
- Degree in Technical Engineering in Computer Systems at the Polytechnic University of Valencia
- Master's Degree in Blockchain and its Business Applications from ThreePoints and the Polytechnic University of Valencia.

Our university employs the best professionals in all areas who share their knowledge to help you"

05

Structure and Content

The syllabus of this Professional Master's Degree in Blockchain Programming covers all the necessary issues to be able to develop complex projects in this field. Accordingly, throughout the program, the computer scientist will study in depth issues such as Blockchain-based sovereign identity, its most novel applications such as NFT and DeFi or its use in economically important sectors such as logistics. In this way, students will be able to master all aspects of programming in this area and thus improve their career prospects.



The latest course content awaits you. Enroll now and get access to the latest advances in programming applied to Blockchain"

Module 1. Blockchain Technology: Technologies Involved and Cyberspace Security

1.1. Cyber Research Techniques
- 1.1.1. Intelligence Analysis
- 1.1.2. Potential Deception on the Internet
- 1.1.3. Advanced Use of Search Tools

1.2. ELK Stacks
- 1.2.1. Logstash
- 1.2.2. ElasticSearch
- 1.2.3. Kibana

1.3. Internet Attribution Techniques
- 1.3.1. Social Media Research Tools
- 1.3.2. Domain and Address Research Tools
- 1.3.3. VirusTotal

1.4. OPSEC and Privacy in Web Research
- 1.4.1. Identity Management
- 1.4.2. Masking the Analyst
- 1.4.3. Operating Systems

1.5. Structural Analysis Techniques
- 1.5.1. Hypothesis Generation and Testing
- 1.5.2. Hypothesis Generation Techniques
- 1.5.3. Structured Hypothesis Refutation Techniques

1.6. Threat Modeling
- 1.6.1. STIX Format
- 1.6.2. MITRE ATT&CK Framework
- 1.6.3. TLP Information Classification
- 1.6.4. Intelligence Competition Strategies
- 1.6.5. Documenting Threats with OpenCTI

1.7. Researching Wallets and Purses
- 1.7.1. Wallet Operation
- 1.7.2. Cracking Wallets
- 1.7.3. Transaction Monitoring

1.8. Connected Services Vulnerabilities
- 1.8.1. Difference between Bugs, Vulnerabilities and Exploits
- 1.8.2. Vulnerability Assessment Metrics
- 1.8.3. Obligations upon Detecting Personal Data Affectation

1.9. Metasploit
- 1.9.1. Object Identification
- 1.9.2. Information Gathering
- 1.9.3. Exploiting Vulnerabilities
- 1.9.4. Malicious App Example

1.10. Smart Contracts Security
- 1.10.1. Tools to Search for Vulnerable Systems
- 1.10.2. Known Ethereum Attack Vectors
- 1.10.3. Exercises on CTF Ethernaut

Module 2. Public Blockchain Development: Ethereum, Stellar and Polkadot

2.1. Ethereum: Public Blockchain
- 2.1.1. Ethereum
- 2.1.2. EVM and GAS
- 2.1.3. Etherescan

2.2. Running Ethereum: Solidity
- 2.2.1. Solidity
- 2.2.2. Remix
- 2.2.3. Compilation and Execution

2.3. Ethereum Framework: Brownie
- 2.3.1. Brownie
- 2.3.2. Ganache
- 2.3.3. Brownie Deployment

2.4. Testing Smart Contracts
- 2.4.1. Test Driven Development (TDD)
- 2.4.2. Pytest
- 2.4.3. Smart Contracts

2.5. Web Connection
- 2.5.1. Metamask
- 2.5.2. Web3.js
- 2.5.3. Ether.js

2.6. Real Project: Fungible Token
- 2.6.1. ERC20
- 2.6.2. Creating Our Token
- 2.6.3. Deployment and Validation

2.7. Stellar Blockchain
- 2.7.1. Stellar Blockchain
- 2.7.2. Ecosystem
- 2.7.3. Compared to Ethereum

2.8. Programming Stellar
- 2.8.1. Horizon
- 2.8.2. Stellar SDK
- 2.8.3. Fungible Token Project

2.9. Polkadot Project
- 2.9.1. Polkadot Project
- 2.9.2. Ecosystem
- 2.9.3. Interacting with Ethereum and Other Blockchains

2.10. Programming Polkadot
- 2.10.1. Substrate
- 2.10.2. Creating Parachain on Substrate
- 2.10.3. Polkadot Integration

Module 3. Corporate Blockchain Development: Hyperledger Besu

3.1. Besu Configuration
- 3.1.1. Key Configuration Parameters in Production Environments
- 3.1.2. Finetuning for Connected Services
- 3.1.3. Good Configuration Practices

3.2. Blockchain Configuration
- 3.2.1. Key Configuration Parameters for PoA
- 3.2.2. Key Configuration Parameters for PoW
- 3.2.3. Genesis Block Configurations

3.3. Securing Besu
- 3.3.1. Secure the RPC with TLS
- 3.3.2. RPC Securitization with NGINX
- 3.3.3. Securitization by Means of a Node Scheme

3.4. Besu in High Availability
- 3.4.1. Node Redundancy
- 3.4.2. Balancers for Transactions
- 3.4.3. Transaction Pool over Messaging Queue

3.5. Offchain Tools
- 3.5.1. Privacy– Tessera
- 3.5.2. Identity– Alastria ID
- 3.5.3. Data Indexing – Subgraph

3.6. Applications Developed on Besu
- 3.6.1. ERC20 Tokens-Based Applications
- 3.6.2. ERC 721 Tokens-Based Applications
- 3.6.3. ERC 1155 Token-Based Applications

3.7. Besu Deployment and Automation
- 3.7.1. Besu from Docker
- 3.7.2. Besu from Kubernetes
- 3.7.3. Besu in Blockchain as a Service

3.8. Besu Interoperability with Other Clients
- 3.8.1. Interoperability with Geth
- 3.8.2. Interoperability with Open Ethereum
- 3.8.3. Interoperability with Other DLTs

3.9. Plugins for Besu
- 3.9.1. Most Common Plugins
- 3.9.2. Plugin Development
- 3.9.3. Installation of Plugins

3.10. Configuration of Development Environments
- 3.10.1. Creation of a Developing Environment
- 3.10.2. Creation of a Customer Integration Environment
- 3.10.3. Creating a Pre-Production Environment for Load Testing

Module 4. Corporate Blockchain Development: Hyperledger Fabric

4.1. Hyperledger
- 4.1.1. Hyperledger Ecosystem
- 4.1.2. Hyperledger Tools
- 4.1.3. Hyperledger Frameworks

4.2. Hyperledger Fabric – Components of its Architecture. State-of-the-Art
- 4.2.1. State-of-the-Art of Hyperledger Fabric
- 4.2.2. Nodes
- 4.2.3. Orderers
- 4.2.4. CouchDB and LevelDB
- 4.2.5. CA

4.3. Hyperledger Fabric – Architectural Components. Process of a Transaction
- 4.3.1. Process of a Transaction
- 4.3.2. Chain Codes
- 4.3.3. MSP

4.4. Enabling Technologies
- 4.4.1. Go
- 4.4.2. Docker
- 4.4.3. Docker Compose
- 4.4.4. Other Technology

4.5. Pre-Requisite Installation and Environment Preparation
- 4.5.1. Server Preparation
- 4.5.2. Download Prerequisites
- 4.5.3. Download from Official Hyperledger Repository

4.6. First Deployment
- 4.6.1. Automatic Test-Network Deployment
- 4.6.2. Guided Test NetworkDeployment
- 4.6.3. Review of Deployed Components

4.7. Second Deployment
- 4.7.1. Deployment of Private Data Collection
- 4.7.2. Integration against a Fabric Network
- 4.7.3. Other Projects

4.8. Chain Codes
- 4.8.1. Structure of a Chain Code
- 4.8.2. Deployment and Upgrade of Chaincodes
- 4.8.3. Other Important Chaincode Functions

4.9. Connection to other HyperledgerTools (Caliper and Explorer)
- 4.9.1. Hyperledger Explorer Installation
- 4.9.2. Hyperledger Caliper Installation
- 4.9.3. Other Important Tools

4.10. Certification
- 4.10.1. Types of Official Certifications
- 4.10.2. Preparation for CHFA
- 4.10.3. Developer Profiles vs. Administrator Profiles

Module 5. Sovereign Identity Based on Blockchain

5.1. Digital Identity
- 5.1.1. Personal Data
- 5.1.2. Social Networks
- 5.1.3. Control Over Data
- 5.1.4. Authentication
- 5.1.5. Identification

5.2. Blockchain Identity
- 5.2.1. Digital Signature
- 5.2.2. Public Networks
- 5.2.3. Permitted Networks

5.3. Sovereign Digital Identity
- 5.3.1. Requirements
- 5.3.2. Components
- 5.3.3. Applications

5.4. Decentralized Identifiers (DIDs)
- 5.4.1. Layout
- 5.4.2. DID Methods
- 5.4.3. DID Documents

5.5. Verifiable Credentials
- 5.5.1. Components
- 5.5.2. Flows
- 5.5.3. Security and Privacy
- 5.5.4. Blockchain to Register Verifiable Credentials

5.6. Blockchain Technologies for Digital Identity
- 5.6.1. Hyperledger Indy
- 5.6.2. Sovrin
- 5.6.3. uPort
- 5.6.4. ID Alastria

5.7. European Blockchain and Identity Initiatives
- 5.7.1. eIDAS
- 5.7.2. EBSI
- 5.7.3. ESSIF

5.8. Digital Identity of Things (IoT)
- 5.8.1. IoT Interactions
- 5.8.2. Semantic Interoperability
- 5.8.3. Data Security

5.9. Digital Identity of Processes
- 5.9.1. Daata
- 5.9.2. Code
- 5.9.3. Interfaces

5.10. Blockchain Digital Identity Use Cases
- 5.10.1. Health
- 5.10.2. Educational
- 5.10.3. Logistics
- 5.10.4. Public Administration

Module 6. Blockchain and its new applications: DeFi and NFT

6.1. Financial Culture
- 6.1.1. Evolution of Money
- 6.1.2. Fiat money vs. Decentralized Money
- 6.1.3. Digital Bank vs. Open Finance

6.2. Ethereum
- 6.2.1. Technology
- 6.2.2. Decentralized Money
- 6.2.3. Stablecoins

6.3. Other Technology
- 6.3.1. Binance Smart Chain
- 6.3.2. Polygon
- 6.3.3. Solana

6.4. DeFi (Decentralized Finance)
- 6.4.1. DeFi
- 6.4.2. Challenges
- 6.4.3. Open Finance vs. DeFi

6.5. Information Tools
- 6.5.1. Metamask and Decentralized Wallets
- 6.5.2. CoinMarketCap
- 6.5.3. DefiPulse

6.6. Stablecoins
- 6.6.1. Protocol Maker
- 6.6.2. USDC, USDT, BUSD
- 6.6.3. Forms of Collateralization and Risks

6.7. Exchanges and Decentralized Exchanges and Platforms (DEX)
- 6.7.1. Uniswap
- 6.7.2. SushiSwap
- 6.7.3. AAVe
- 6.7.4. dYdX/Synthetix

6.8. NFT Ecosystem (Non-Fungible Tokens)
- 6.8.1. NFTs
- 6.8.2. Typology
- 6.8.3. Features

6.9. Capitulation of Industries
- 6.9.1. Design Industry
- 6.9.2. Fan Token Industry
- 6.9.3. Project Financing

6.10. NFT Markets
- 6.10.1. Opensea
- 6.10.2. Rarible
- 6.10.3. Customized Platforms

Module 7. Blockchain. Legal Implications

7.1. Bitcoin
- 7.1.1. Bitcoin
- 7.1.2. Whitepaper Analysis
- 7.1.3. Operation of the Proof of Work

7.2. Ethereum
- 7.2.1. Ethereum: Origins
- 7.2.2. Proof of Stake Operation
- 7.2.3. DAO Case

7.3. Current Status of the Blockchain
- 7.3.1. Growth of Cases
- 7.3.2. Blockchain Adoption by Large Companies

7.4. MiCA (Market in Cryptoassets)
- 7.4.1. Birth of the Standard
- 7.4.2. Legal Implications (Obligations, Obligated Parties, etc.)
- 7.4.3. Summary of the Standard

7.5. Prevention of Money Laundering
- 7.5.1. Fifth Directive and its Transposition
- 7.5.2. Obligated Parties
- 7.5.3. Intrinsic Obligations

7.6. Tokens
- 7.6.1. Tokens
- 7.6.2. Types
- 7.6.3. Applicable Regulations in Each Case

7.7. ICO/STO/IEO: Corporate Financing Systems
- 7.7.1. Types of Financing
- 7.7.2. Applicable Regulations
- 7.7.3. Success Stories

7.8. NFT (Non-Fungible Tokens)
- 7.8.1. NFT
- 7.8.2. Applicable Regulations
- 7.8.3. Use Cases and Success (Play to Earn)

7.9. Taxation and Cryptoassets
- 7.9.1. Taxation
- 7.9.2. Income from Work
- 7.9.3. Income from Economic Activities

7.10. Other Applicable Regulations
- 7.10.1. General Data Protection Regulation
- 7.10.2. DORA (Cybersecurity)
- 7.10.3. EIDAS Regulations

Module 8. Blockchain Architecture Design

8.1. Blockchain Architecture Design
- 8.1.1. Architecture
- 8.1.2. Infrastructure Architecture
- 8.1.3. Software Architecture
- 8.1.4. Integration Deployment

8.2. Types of Networks
- 8.2.1. Public Networks
- 8.2.2. Private Networks
- 8.2.3. Permitted Networks
- 8.2.4. Differences

8.3. Participant Analysis
- 8.3.1. Company Identification
- 8.3.2. Customer Identification
- 8.3.3. Consumer Identification
- 8.3.4. Interaction Between Parties

8.4. Proof-of-Concept Design
- 8.4.1. Functional Analysis
- 8.4.2. Implementation Phases

8.5. Infrastructure Requirements
- 8.5.1. Cloud
- 8.5.2. Physical
- 8.5.3. Hybrid

8.6. Security Requirements
- 8.6.1. Certificate
- 8.6.2. HSM
- 8.6.3. Encryption

8.7. Communications Requirements
- 8.7.1. Network Speed Requirements
- 8.7.2. I/O Requirements
- 8.7.3. Transaction Requirements Per Second
- 8.7.4. Affecting Requirements with the Network Infrastructure

8.8. Software Testing, Performance and Stress Testing
- 8.8.1. Unit Testing in Development and Pre-Production Environments
- 8.8.2. Infrastructure Performance Testing
- 8.8.3. Pre-Production Testing
- 8.8.4. Production Testing
- 8.8.5. Version Control

8.9. Operation and Maintenance
- 8.9.1. Support: Alerts
- 8.9.2. New Versions of Infrastructure Components
- 8.9.3. Risk Analysis
- 8.9.4. Incidents and Changes

8.10. Continuity and Resilience
- 8.10.1. Disaster Recovery
- 8.10.2. Backup
- 8.10.3. New Participants

Module 9. Blockchain Applied to Logistics

9.1. Operational AS IS Mapping and Possible Gaps
- 9.1.1. Identification of Manually Executed Processes
- 9.1.2. Identification of Participants and their Particularities
- 9.1.3. Case Studies and Operational Gaps
- 9.1.4. Presentation and Mapping Executive Staff

9.2. Map of Current Systems
- 9.2.1. Current Systems
- 9.2.2. Master Data and Information Flow
- 9.2.3. Governance Model

9.3. Application of Blockchain to Logistics
- 9.3.1. Blockchain Applied to Logistics
- 9.3.2. Traceability-Based Architectures for Business Processes
- 9.3.3. Critical Success Factors in Implementation
- 9.3.4. Practical Advice

9.4. TO BE Model
- 9.4.1. Operational Definition for Supply Chain Control
- 9.4.2. Structure and Responsibilities of the Systems Plan
- 9.4.3. Critical Success Factors in Implementation

9.5. Construction of the Business Case
- 9.5.1. Cost Structure
- 9.5.2. Projected Benefits
- 9.5.3. Approval and Acceptance of the Plan by the Owners

9.6. Creation of Proof of Concept (POC)
- 9.6.1. Importance of a POC for New Technologies
- 9.6.2. Key Aspects
- 9.6.3. Examples of POCs with Low Cost and Effort

9.7. Project Management
- 9.7.1. Agile Methodology
- 9.7.2. Decision of Methodologies Among all Participants
- 9.7.3. Strategic Development and Deployment Plan

9.8. Systems Integration: Opportunities and Needs
- 9.8.1. Structure and Development of the Systems Planning
- 9.8.2. Data Master Model
- 9.8.3. Roles and Responsibilities
- 9.8.4. Integrated Management and Monitoring Model

9.9. Development and Implementation with Supply Chain Team
- 9.9.1. Active Participation of the Customer (Business)
- 9.9.2. Systemic and Operational Risk Analysis
- 9.9.3. Key to Success: Testing Models and Post-Production Support

9.10. Change Management: Follow-up and Update
- 9.10.1. Management Implications
- 9.10.2. Rollout Plan and Training Program
- 9.10.3. KPI Tracking and Management Models

Module 10. Blockchain and Business

10.1. Applying Technology throughout the Company
- 10.1.1. Applying Blockchain
- 10.1.2. Blockchain Benefits
- 10.1.3. Common Implementation Mistakes

10.2. Blockchain Implementation Cycle
- 10.2.1. From P2P to Distributed Systems
- 10.2.2. Key Aspects for Proper Implementation
- 10.2.3. Improving Current Implementations

10.3. Blockchain vs. Traditional Technologies: Basics
- 10.3.1. APIs Data and Flows
- 10.3.2. Tokenization as a Cornerstone for Projects
- 10.3.3. Incentives

10.4. Selecting Blockchain Type
- 10.4.1. Public Blockchain
- 10.4.2. Private Blockchain
- 10.4.3. Consortiums

10.5. Blockchain and the Public Sector
- 10.5.1. Blockchain in the Public Sector
- 10.5.2. Central Bank Digital Currency (CBDC)
- 10.5.3. Conclusions

10.6. Blockchain and the Financial Sector Start
- 10.6.1. CBDC and Banking
- 10.6.2. Native Digital Assets
- 10.6.3. Where It Does Not Fit

10.7. Blockchain and the Pharmaceutical Sector
- 10.7.1. Searching for Meaning in the Field
- 10.7.2. Logistics or Pharmacy
- 10.7.3. Application

10.8. Pseudo Private Blockchains: The Point of Consortiums
- 10.8.1. Reliable Environments
- 10.8.2. Analysis and Delving Deeper
- 10.8.3. Valid Implementations

10.9. Blockchain. Usage Case in Europe EBSI
- 10.9.1. EBSI (European Blockchain Services Infrastructure)
- 10.9.2. The Business Model
- 10.9.3. Future

10.10. The Future of Blockchain
- 10.10.1. Trilemma
- 10.10.2. Automation
- 10.10.3. Conclusions

“There is no better program to study Blockchain and its programming in depth”

06

Methodology

This academic program offers students a different way of learning. Our methodology uses a cyclical learning approach: **Relearning.**

This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.

Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"

Case Study to contextualize all content

Our program offers a revolutionary approach to developing skills and knowledge. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

At TECH, you will experience a learning methodology that is shaking the foundations of traditional universities around the world"

You will have access to a learning system based on repetition, with natural and progressive teaching throughout the entire syllabus.

The student will learn to solve complex situations in real business environments through collaborative activities and real cases.

A learning method that is different and innovative

This TECH program is an intensive educational program, created from scratch, which presents the most demanding challenges and decisions in this field, both nationally and internationally. This methodology promotes personal and professional growth, representing a significant step towards success. The case method, a technique that lays the foundation for this content, ensures that the most current economic, social and professional reality is taken into account.

> *Our program prepares you to face new challenges in uncertain environments and achieve success in your career"*

The case method has been the most widely used learning system among the world's leading Information Technology schools for as long as they have existed. The case method was developed in 1912 so that law students would not only learn the law based on theoretical content. It consisted of presenting students with real-life, complex situations for them to make informed decisions and value judgments on how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

What should a professional do in a given situation? This is the question that you are presented with in the case method, an action-oriented learning method. Throughout the course, students will be presented with multiple real cases. They will have to combine all their knowledge and research, and argue and defend their ideas and decisions.

Relearning Methodology

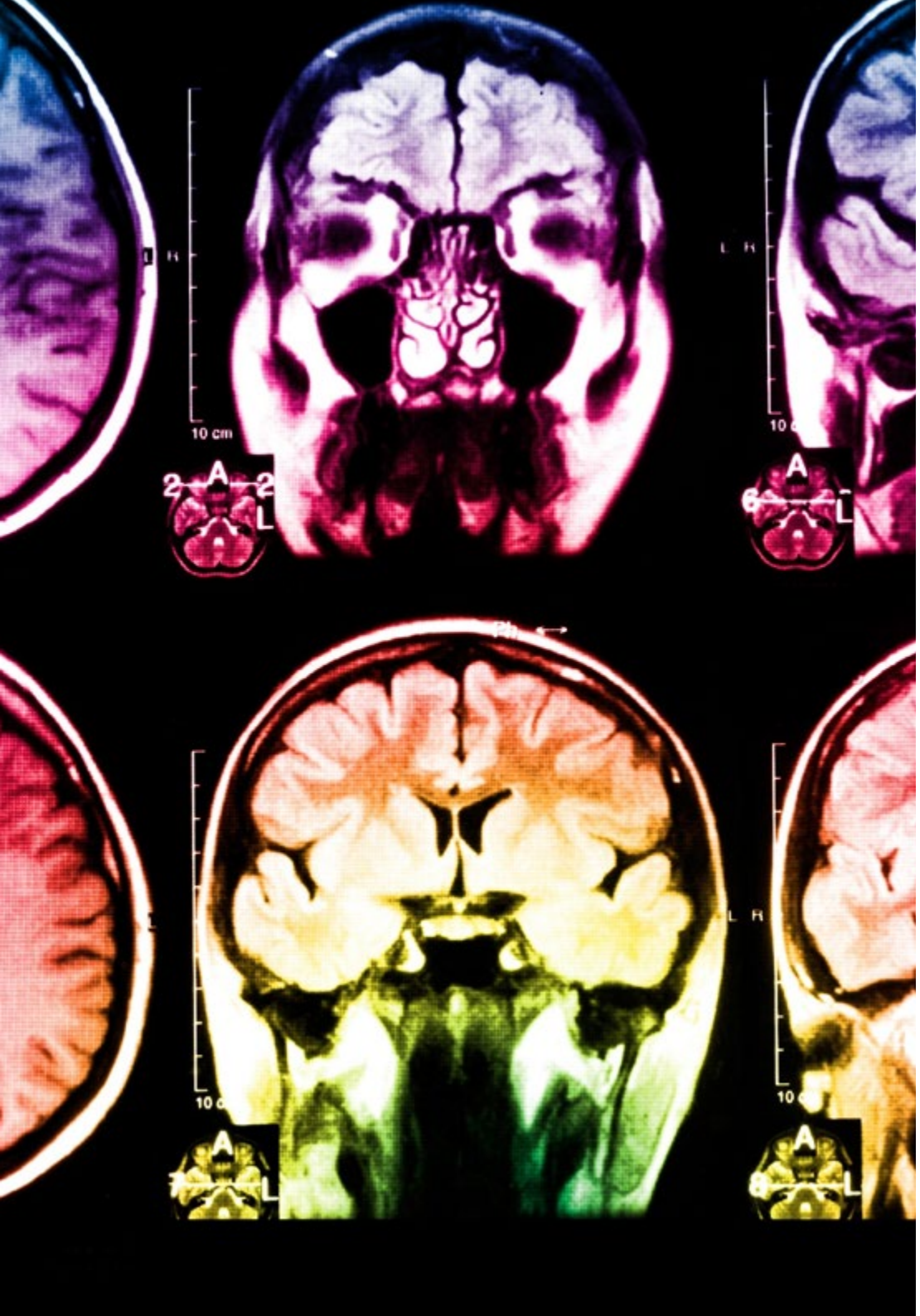
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines different teaching elements in each lesson.

We enhance the Case Study with the best 100% online teaching method: Relearning.

In 2019, we obtained the best learning results of all online universities in the world.

At TECH you will learn using a cutting-edge methodology designed to train the executives of the future. This method, at the forefront of international teaching, is called Relearning.

Our university is the only one in the world authorized to employ this successful method. In 2019, we managed to improve our students' overall satisfaction levels (teaching quality, quality of materials, course structure, objectives...) based on the best online university indicators.



In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically. This methodology has trained more than 650,000 university graduates with unprecedented success in fields as diverse as biochemistry, genetics, surgery, international law, management skills, sports science, philosophy, law, engineering, journalism, history, and financial markets and instruments. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

Relearning will allow you to learn with less effort and better performance, involving you more in your training, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation for success.

From the latest scientific evidence in the field of neuroscience, not only do we know how to organize information, ideas, images and memories, but we know that the place and context where we have learned something is fundamental for us to be able to remember it and store it in the hippocampus, to retain it in our long-term memory.

In this way, and in what is called neurocognitive context-dependent e-learning, the different elements in our program are connected to the context where the individual carries out their professional activity.

This program offers the best educational material, prepared with professionals in mind:

Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

These contents are then applied to the audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high quality pieces in each and every one of the materials that are made available to the student.

Classes

There is scientific evidence suggesting that observing third-party experts can be useful.

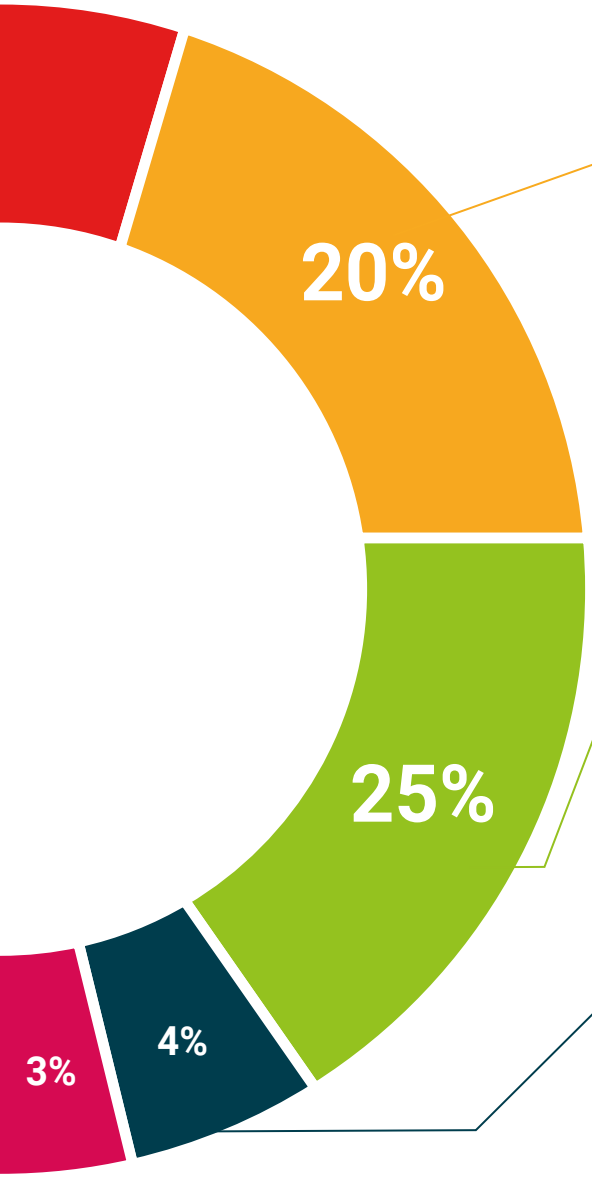
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

Practising Skills and Abilities

They will carry out activities to develop specific skills and abilities in each subject area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization that we are experiencing.

Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.



Case Studies

Students will complete a selection of the best case studies chosen specifically for this program. Cases that are presented, analyzed, and supervised by the best specialists in the world.

Interactive Summaries

The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".

Testing & Retesting

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises, so that they can see how they are achieving their goals.

07

Certificate

The Professional Master's Degree in Blockchain Programming guarantees students, in addition to the most rigorous and up-to-date education, access to a Professional Master's Degree issued by TECH Global University.

Successfully complete this program and receive your university qualification without having to travel or fill out laborious paperwork"

This program will allow you to obtain your **Professional Master's Degree diploma in Blockchain Programming** endorsed by **TECH Global University**, the world's largest online university.

TECH Global University is an official European University publicly recognized by the Government of Andorra (***official bulletin***). Andorra is part of the European Higher Education Area (EHEA) since 2003. The EHEA is an initiative promoted by the European Union that aims to organize the international training framework and harmonize the higher education systems of the member countries of this space. The project promotes common values, the implementation of collaborative tools and strengthening its quality assurance mechanisms to enhance collaboration and mobility among students, researchers and academics.

This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Professional Master's Degree in Blockchain Programming**

Modality: **online**

Duration: **12 months**

Accreditation: **60 ECTS**


tech global university

Mr./Ms. _____, with identification document _____
has successfully passed and obtained the title of:

Professional Master's Degree in Blockchain Programming

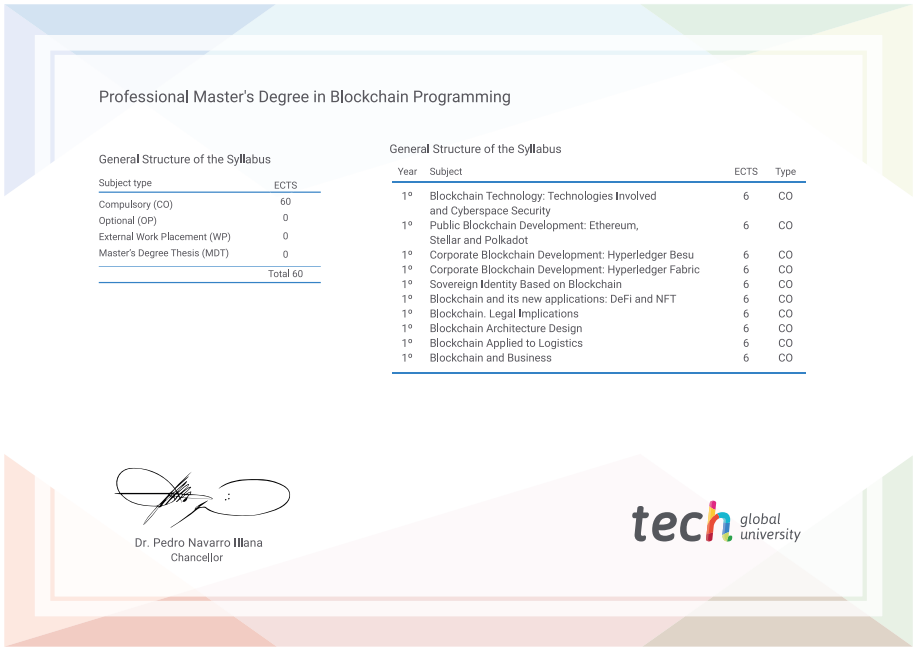
This is a program of 1,500 hours of duration equivalent to 60 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH Global University is a university officially recognized by the Government of Andorra on the 31st of January of 2024, which belongs to the European Higher Education Area (EHEA).

In Andorra la Vella, on the 28th of February of 2024

Dr. Pedro Navarro Illana
Rector

This qualification must always be accompanied by the university degree issued by the competent authority to practice professionally in each country. Unique TECH Code: AFWORD23S techtitute.com/certificates


Professional Master's Degree in Blockchain Programming

General Structure of the Syllabus

Subject type	ECTS
Compulsory (CO)	60
Optional (OP)	0
External Work Placement (WP)	0
Master's Degree Thesis (MDT)	0
	Total 60

General Structure of the Syllabus

Year	Subject	ECTS	Type
1º	Blockchain Technology: Technologies Involved and Cyberspace Security	6	CO
1º	Public Blockchain Development: Ethereum, Stellar and Polkadot	6	CO
1º	Corporate Blockchain Development: Hyperledger Besu	6	CO
1º	Corporate Blockchain Development: Hyperledger Fabric	6	CO
1º	Sovereign Identity Based on Blockchain	6	CO
1º	Blockchain and its new applications: DeFi and NFT	6	CO
1º	Blockchain. Legal Implications	6	CO
1º	Blockchain Architecture Design	6	CO
1º	Blockchain Applied to Logistics	6	CO
1º	Blockchain and Business	6	CO

Dr. Pedro Navarro Illana
Chancellor

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*Apostille Convention. In the event that the student wishes to have their paper diploma issued with an apostille, TECH Global University will make the necessary arrangements to obtain it, at an additional cost.

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Professional Master's Degree

Blockchain Programming

- Modality: **online**
- Duration: **12 months**
- Certificate: **TECH Global University**
- Credits: **60 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

Professional Master's Degree
Blockchain Programming

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