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TECHNICAL SPECIALIZATION

Specialization in Blockchain Engineering and Technology

"For those who already code and want to build real tokens"

4 months · 180 hours · 5 modules · 100% online

Software engineers, blockchain developers, CTOs, systems architects

990 CHF

Program Description

The Specialization in Engineering and Technology is designed for engineers, developers and CTOs who already understand the technology but need to learn how to turn it into scalable, secure and commercially viable tokenization projects. This program does not teach programming from scratch: it assumes technical mastery and builds on it the strategic, security and business layer that transforms a developer into an architect of tokenized ecosystems.

The five modules cover advanced smart contract architecture, professional security auditing using the same tools used by industry leaders, complete decentralized infrastructure, token launch engineering, and a final module on quantum computing and artificial intelligence applied to blockchain — including the PLK (Planck Quantum) project as a central case.

Title	Specialization in Blockchain Engineering and Token Architecture
Program Director	Joan Navarro Delgado — TokenRevolution.net
Format	100% Online · 90-minute live sessions every two weeks (recorded) + asynchronous content
Duration	4 months / approximately 180 hours of learning
Language	Spanish and English — materials available in both languages
Certification	Specialist in Blockchain Engineering and Token Architecture
Profile	Software engineers, blockchain developers, CTOs, systems architects
Entry requirement	Basic programming knowledge + Modules M0-M1 of the General Course or equivalent
Tools	Solidity, Hardhat, OpenZeppelin, Polygon, IPFS, Chainlink, Slither, Mythril, Echidna
Places per edition	30 participants maximum
Price	990 CHF

Learning Objectives

By the end of the specialization, participants will be able to:

- Design professional smart contracts in Solidity using the ERC standard appropriate for each use case.
- Select and justify the correct technical architecture: ERC-20, ERC-721, ERC-1155, ERC-3525.
- Audit smart contracts with automated tools (Slither, Mythril, Echidna) and manual methodology.
- Design complete decentralized infrastructure architectures: storage, oracles, bridges, Layer 2.
- Deploy a complete token on mainnet with operational vesting, staking and a liquidity pool.
- Assess the quantum impact on blockchain security and apply post-quantum cryptography strategies.
- Integrate artificial intelligence into blockchain projects for compliance, anomaly detection and prediction.

Program Structure — 5 Modules over 4 Months

E1 Smart Contract Architecture

3 weeks · 40 hours

The first module establishes the professional technical foundations of smart contract development. The approach is architectural: you don't learn to program from scratch, but rather to design, structure and deploy production-level contracts with senior engineering judgment.

Week 1 — ERC Standards and Architecture Selection

- ERC-20 (fungible tokens): architecture, extensions (mintable, burnable, pausable, snapshot) and business use cases.
- ERC-721 (NFTs): complete standard, on-chain vs off-chain metadata, royalties (EIP-2981) and business applications.
- ERC-1155 (multi-token): gas efficiency, batching and when it clearly outperforms ERC-20 and ERC-721.
- ERC-3525 (Semi-Fungible Token): the emerging standard for fractional assets with unique properties.
- Standards decision tree: methodology for choosing the right contract for each use case.

Week 2 — Professional Development with Solidity and OpenZeppelin

- Solidity best practices: security by design, gas optimization and separation of concerns.
- Design patterns: Proxy, Diamond, Factory, Registry, Access Control — when and how to apply each one.
- OpenZeppelin libraries: access control, upgradeable contracts, token vesting, governor and ERC standards.
- Gas optimization: storage layout, calldata vs memory, efficient data structures for production.
- Professional testing with Hardhat: unit test methodology, fuzz testing and integration.

Week 3 — Upgradeable Contracts and the Deployment Process

- Upgradeable contracts: Transparent Proxy and UUPS patterns — when and how to implement them correctly.
- On-chain permission management: roles, timelocks and multisigs (Gnosis Safe) for production projects.
- Professional migration scripts: reproducible, documented and auditable deployment.
- Contract verification on Etherscan and Polygonscan: process and best practices for public projects.

DELIVERABLE: Workshop: deploy a utility token on testnet with role-based access control, configurable vesting, burn mechanics and upgrade capability. Code commented and documented to production standard.

REAL CASE: BKTL — Health & Sport Technology Token

Analysis of the BKTL project's contract architecture: designed to represent access to the Basket Laboratories platform and its services, manage holders' rights over anonymized basketball-related health data, and distribute recurring revenue. Design decision: why ERC-1155 over ERC-20 for this specific case.

E2 Security Auditing and Cybersecurity

3 weeks · 40 hours

Smart contract security is the highest economic-risk domain in the blockchain ecosystem: billions in documented losses from avoidable vulnerabilities. This module provides the tools, methodology and judgment to audit contracts professionally, using the same tools used by leading industry firms.

Week 4 — Vulnerabilities and Attack Vectors

- Reentrancy attacks: the most costly vector in blockchain history (analysis of the DAO hack and later cases).
- Front-running and MEV (Miner Extractable Value): how validators exploit transaction ordering.
- Oracle manipulation: attacks through compromised price feeds — real DeFi cases analyzed.
- Integer overflow/underflow, access control vulnerabilities, delegatecall injection — a complete catalogue of risks.
- Flash loan attacks: attack architecture, real cases and how to design resistant contracts.

Week 5 — Automated and Manual Auditing Tools

- Slither: static analysis for Solidity — installation, advanced configuration and interpreting results.
- Mythril: dynamic symbolic analysis — use cases and limitations compared to pure static analysis.
- Echidna: property-based fuzzing — how to find vulnerabilities other tools don't detect.
- Manual audit methodology: the 40-point checklist a professional auditor reviews on every contract.
- How to read an audit report: severity classification, remediation prioritization and client communication.

Week 6 — Operational Security and Incident Response

- Key management for institutional issuers: HSMs, multisigs (Gnosis Safe) and timelocks.
- Institutional custody: Fireblocks, Copper, BitGo — selection criteria and initial configuration.
- On-chain monitoring: Tenderly, OpenZeppelin Defender, Forta — automated alerts in production.
- Incident response protocol: exact steps to take when a contract is exploited — crisis guide.
- Bug bounty programs: how to structure a security rewards program for production projects.

DELIVERABLE: Applied audit: audit a real contract from the Token Revolution portfolio using the full tool suite. Deliver a professional audit report with findings classified by severity and specific remediation recommendations.

E3 Decentralized Infrastructure and Integrations

3 weeks · 35 hours

A smart contract is only the core of a tokenized ecosystem. This module covers the full surrounding infrastructure: decentralized storage, oracles, Layer 2 solutions, bridges and connections to the traditional finance world.

Week 7 — Decentralized Storage

- IPFS: architecture, content addressing, pinning services (Pinata, Infura) and token metadata management.
- Arweave: permanent storage — when guaranteed permanence justifies the higher cost.
- Filecoin: incentivized storage — differences from pure IPFS and concrete business use cases.
- Strategy for RWA projects: legal documentation, ownership certificates and on-chain white papers.
- IPFS + NFTs: correct metadata management so tokens don't lose value if the server goes down.

Week 8 — Oracles, Layer 2 and Bridges

- Chainlink: architecture of the leading protocol — price feeds, VRF, Automation and Functions for contracts.
- Oracle integration for RWA: how to bring data from the physical world (prices, valuations, certificates) onto the blockchain.
- Layer 2: Polygon, Arbitrum, Optimism, zkSync — technical differences, selection criteria and cost comparison.
- Rollups: Optimistic vs ZK-Rollups — implications for security and finality time.
- Cross-chain bridges: architecture, critical risks (bridges are the ecosystem's most vulnerable point) and best practices.

Week 9 — APIs, Indexing and Traditional Connections

- The Graph: indexing on-chain data for dashboards and analytics of production projects.
- APIs and webhooks: connecting token projects to traditional payment systems, ERPs and CRMs.
- On-chain KYC: integrating verified identity providers (Onfido, Jumio) with access contracts.
- Fiat-crypto payment gateways: solutions so that non-crypto investors can participate in a presale.

DELIVERABLE: Infrastructure project: design the complete infrastructure architecture for your own token. Includes network selection and justification, storage strategy, required oracles, L2 solution if applicable, and integration APIs with off-chain systems.

E4 Token Launch Engineering

3 weeks · 35 hours

The technical synthesis module: everything needed to take a token from testnet to mainnet with production-grade guarantees — from vesting contracts to liquidity pools, including staking and advanced NFT mechanics.

Week 10 — Secure Mainnet Deployment

- Go-live checklist: the 30 points that must be verified before deploying to mainnet.
- Multisig as contract owner: Gnosis Safe configuration for institutional production projects.
- Timelock controllers: time delay for critical operations — protection against governance attacks.
- Post-deployment monitoring: dashboards, alerts and contract health metrics in production.
- Public contract verification: the complete process for Etherscan, Polygonscan and equivalents.

Week 11 — Vesting, Staking and Benefit Distribution

- Vesting contracts: cliff + linear vesting, milestone acceleration, revocation — secure implementation.
- Staking contracts: fixed, dynamic and tiered APY — implementation patterns and specific auditing.
- On-chain dividend distribution: proportional profit-sharing for RWA projects with multiple holders.
- Yield farming: the MasterChef pattern, risk analysis and safer alternatives for production.

Week 12 — Liquidity and Advanced NFTs

- Creating liquidity pools on Uniswap V3: price ranges, position management and fee tiers.
- Balancer and SushiSwap: alternatives with specific features for business token projects.
- Advanced NFT mechanics: whitelist minting, reveal, state evolution and burn-to-claim.
- Soulbound Tokens (SBTs): non-transferable tokens for certifications, memberships and on-chain credentials.

DELIVERABLE: Technical capstone: complete deployment of your own token on testnet with main contract, team and investor vesting, basic staking with rewards, and an initial liquidity pool. Technical documentation ready for external audit.

REAL CASE: BKTL — Basketball Token (Cornellà-Barcelona)

Technical analysis of the BKTL ecosystem: contract architecture for Spain's first tokenized high-performance basketball ecosystem, membership mechanics, distribution of club revenue to holders, and the governance contract for the sports ecosystem.

E5 Quantum Computing and AI — The Future of Blockchain

2 weeks · 30 hours

The most forward-looking module of the program: preparing blockchain engineers for the threats and opportunities of quantum computing and artificial intelligence. With the PLK (Planck Quantum) project as the central axis of applied analysis.

Week 13 — Quantum Computing and Post-Quantum Cryptography

- Qubits, superposition and entanglement: the essentials every blockchain engineer must understand.
- Shor's algorithm: why quantum computing threatens the ECDSA cryptography that protects today's blockchain.
- Grover's algorithm: impact on hash functions and proof-of-work security.
- NIST post-quantum cryptography standards (2024): CRYSTALS-Kyber, CRYSTALS-Dilithium, SPHINCS+.
- Migration strategies: how to prepare contracts and infrastructure for the imminent post-quantum future.
- PLK Case — Planck Quantum: technical analysis of the tokenized quantum middleware and its market value proposition.

Week 14 — Artificial Intelligence + Blockchain

- AI for automated compliance: on-chain AML pattern detection and monitoring of high-risk wallets.
- Anomaly detection in contracts: ML models to identify suspicious behavior in real time.
- Predictive tokenomics: price, demand and liquidity projection models based on historical on-chain data.
- Zero-Knowledge Proofs (ZKPs): privacy without sacrificing verifiability — zkSNARKs vs zkSTARKs.
- AI + NFTs: procedural generation, dynamic personalization and token evolution based on external data.

DELIVERABLE: Post-quantum risk analysis for your own token: identify vulnerable cryptographic components and propose a migration roadmap. Bonus: design an AI module for compliance, pricing or anomaly detection within the token ecosystem.

Project Portfolio — Technical Case Studies

Token Revolution portfolio projects especially relevant from a blockchain engineering standpoint:

Token	Sector	Description
TREV	Tokenization services	Comprehensive tokenization services platform for startups, companies, associations, foundations and entrepreneurs.
1LX	Multimedia technology	Advanced sustainable multimedia technology systems and next-generation content infrastructure.
PLK	Quantum computing	Cloud quantum middleware that lets tech companies integrate quantum computing without specialized staff.
CLAI	Legal AI + Blockchain	AI-driven blockchain legal advisory platform for international clients across multiple jurisdictions.
BKTL	Elite sport	Spain's first high-performance basketball ecosystem (Cornellà, Barcelona). Global Basket-LAB network.

All projects in the full portfolio are used as reference material throughout the program:

Token	Sector	Description
PROA	Heritage real estate	Sustainable acquisition and operation of historic buildings for social, healthcare and medical research use.
TREV	Tokenization services	Comprehensive tokenization services platform for startups, companies, associations, foundations and entrepreneurs.
RSID	Hospitality and sport	Sustainable restaurants and sports facilities — a tokenized access and loyalty ecosystem.
1LX	Multimedia technology	Advanced sustainable multimedia technology systems and next-generation content infrastructure.
TFH	Tourism + AI	AI-driven platform for selecting sustainable tourism experiences that generate personal wellbeing.
PLK	Quantum computing	Cloud quantum middleware that lets tech companies integrate quantum computing without specialized staff.
CLAI	Legal AI + Blockchain	AI-driven blockchain legal advisory platform for international clients across multiple jurisdictions.
TWR	Water resources	TechWater: scalable sustainable water infrastructure for environments of extreme scarcity. Nonprofit.
BIOP	Sustainable luxury tourism	BIO boutique luxury (centered in Albarracín) expanding to Valencia and international markets.
BKTL	Elite sport	Spain's first high-performance basketball ecosystem (Cornellà, Barcelona). Global Basket-LAB network.
SMD	Solidarity mining	Gold mining in Guinea-Conakry with solidarity investment in local education, agriculture and health.
OLEUM	Agriculture / Olive growing	Global sustainable olive-growing system: healthy food, therapeutic cosmetics and agrotourism.

Teaching Team

Joan Navarro Delgado — Founder & Director, TokenRevolution.net

Cybersecurity expert with more than two decades of experience in applied cryptography and digital strategy. Specialized in blockchain and crypto-assets since 2016. Active portfolio of 13+ tokenized projects across 13 industrial sectors. Member of AENOR, CEN and ISO working groups on digital identity and tokenized payment systems.

Company	Token Revolution (TokenRevolution.net) — Founder & Director
Education	Universitat Oberta de Catalunya (UOC)
Cybersecurity	More than 30 years of experience in cybersecurity and applied cryptography
Blockchain	Specialized in blockchain and crypto-assets since 2016
Active portfolio	13+ tokens designed and launched across 13 different industrial sectors
Standards	Member of AENOR, CEN and ISO — digital identity and payment methods
Languages	Spanish (native) · English (professional) — materials available in both

Live sessions feature guest experts from the industry: notaries specialized in digital assets, blockchain tax lawyers, engineers from international exchanges, university lecturers and entrepreneurs who have already tokenized their own projects.

Practical Information

Format	100% online — 90-minute live sessions every two weeks (recorded) + asynchronous independent work
Places	Maximum 30 participants per edition
Language	Spanish and English — materials available in both languages
Upcoming editions	October 1 · March 1
Price	990 CHF
Contact	trev@tokenrevolution.net · tokenrevolution.net