



Executive Summary

Blockchain Certification Program



Blockchain⁺
Developer
Practitioner™

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Introduction

The Blockchain+ Developer Practitioner certification provides a comprehensive introduction to blockchain technology and smart contracts, giving learners the skills and knowledge they need to succeed in this fast-changing sector. This certification begins with a comprehensive look at blockchain's history, essential principles, and decentralized system technology. Learners will explore consensus techniques like PoW and PoS, smart contracts, and their implementation and management in languages like Solidity. Advanced Solidity structures, tokenization, and non-fungible tokens will be covered throughout the certification.

Further, hands-on experience with Truffle, Ganache, and the Remix IDE helps create, test, and deploy decentralized applications. You will also cover Hyperledger Fabric architecture, Docker deployment, and Golang programming for private blockchain networks. Chaincode creation, REST API integration, and smart contract auditing conclude the certification, preparing developers for real-world blockchain development and smart contract implementation issues.

The certification covers the following topics to help you understand the incorporation of blockchain in the developer's role.

- Introduction to Blockchain and Smart Contracts
- Ethereum Virtual (EVM) and Solidity Basics
- Advanced Solidity and Structures
- Tokenization and NFTs
- Development Tools and Techniques
- DApp Integration and Testing
- Deep Dive into the Hyperledger Fabric
- AI Enabled Incident Response Systems
- Golang Programming for Hyperledger Fabric
- Chaincode Structure and Error Handling
- Custom Chaincode
- Smart Contract Auditing and Tools Hyperledger Fabconnect, and Firefly

Certification Prerequisites

- **Basic Understanding of Programming Concepts:** Familiarity with general programming concepts like data structures, algorithms, and networks.
- **Proficiency in Programming Language:** Understanding of at least one legacy programming stack (e.g. Python, JavaScript, Java, or similar).
- **Hands-on Experience in Command Line Consoles:** Fundamental knowledge to use command line consoles on any operating system.
- **Ability to Understand Developer Concepts:** Should be able to understand Developer Concepts like SDKs, APIs, application development tools, etc.
- **Hands-on Experience in Application Development:** Must have experience with building end-to-end tiered applications.

Who Should Enroll?

- **Entrepreneurs and Startups:** Gain insights into building decentralized applications and enhancing transaction transparency.
- **Software Developers and Engineers:** Learn to create, deploy, and maintain blockchain solutions and smart contracts.
- **IT Professionals:** Acquire knowledge to integrate blockchain into IT infrastructures for data security and efficiency.
- **Business Analysts and Consultants:** Understand how to analyze and implement blockchain solutions to optimize business operations.
- **Financial Services Professionals:** Utilize blockchain for secure transaction processing, fraud reduction, and regulatory compliance.

Certification Goals and Learning Outcomes

- Understand the fundamentals of blockchain technology and smart contracts.
- Learn about Ethereum Virtual Machine (EVM) and Solidity programming language.
- Explore advanced features and techniques in Solidity programming.
- Gain knowledge about Non-Fungible Tokens (NFTs) and their implementation.
- Familiarize with developer tools and techniques for blockchain development.
- Develop skills in testing and integrating Decentralized Applications (DApps).
- Learn about setting up and managing private blockchains using Hyperledger Fabric (HLF).
- Dive deeper into Hyperledger Fabric architecture and features.
- Gain proficiency in Go programming language.
- Understand the concepts and implementation of chaincode in Hyperledger Fabric.
- Explore customization of chaincode for specific use cases.
- Learn about Docker, Firefly, and Fabconnect for blockchain development and deployment.

The Impact of Blockchain on Modern Development Practices

Blockchain technology, often seen as groundbreaking, has quickly changed the digital world. A report from Markets and Markets predicts that the global blockchain market will grow from USD \$20.1 billion in 2024 to USD \$248.9 billion by 2029, with an annual growth rate of 65.5%. Bitcoin, created by Satoshi Nakamoto in 2008, started the trend of decentralized cryptocurrencies and opened the door to more uses for blockchain. Ethereum took this further by adding smart contracts and decentralized apps, allowing for a wide range of solutions beyond just financial transactions.

BLOCKCHAIN MARKET GLOBAL FORECAST TO 2029 (USD BILLION)

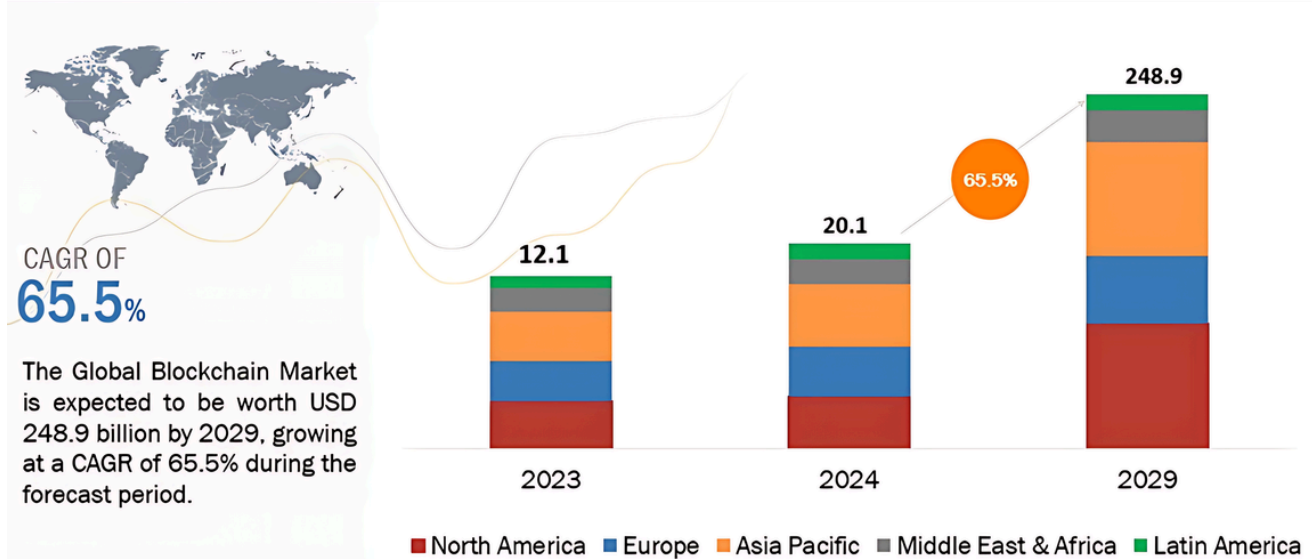


Figure 1: Blockchain Technology Market Share (2024-2029)

Source: Markets and Markets

Looking at regions, North America has led the blockchain market from the start, thanks to a strong network of tech startups, big companies, and top research institutions that support blockchain development. In contrast, the Asia Pacific region is expected to grow rapidly, with governments in countries like China, Japan, and India encouraging the use of blockchain for its transparency and efficiency across different industries.

From a developer's perspective, the evolution of blockchain technologies has been transformative. Initially, Bitcoin's creation in 2008 introduced a decentralized ledger system, revolutionizing digital currency and transactions. Developers then saw Ethereum's launch in 2015 as a significant milestone, adding programmable smart contracts and decentralized applications (dApps) to the blockchain, vastly expanding its utility. Recent advancements, such as zero-knowledge rollups and enhanced interoperability from 2016 to 2023, have further optimized blockchain networks, improving scalability, efficiency, and connectivity. These innovations have empowered developers to build more robust and versatile blockchain ecosystems, fostering a new era of decentralized technology applications.

What is Next for Blockchain?

For blockchain developers, the future holds exciting advancements and opportunities. Next-generation blockchain technologies are expected to focus on enhanced scalability, privacy, and interoperability. Innovations such as sharding, Layer 2 solutions, and zero-knowledge proofs will enable more efficient and scalable blockchain networks.

Developers will also see an increased emphasis on decentralized finance (DeFi), non-fungible tokens (NFTs), and cross-chain integrations, allowing for more seamless interactions between different blockchain platforms. As regulatory frameworks evolve, developers will need to integrate compliance and security measures into their projects. These trends will push the boundaries of what blockchain technology can achieve, offering developers the tools to build more advanced, secure, and versatile applications.

How Blockchain Transforms the Roles and Responsibilities of Software Developers

Blockchain technology can significantly transform the roles and responsibilities of developers by introducing new paradigms and opportunities in software development. Here are several keyways in which this transformation can occur:

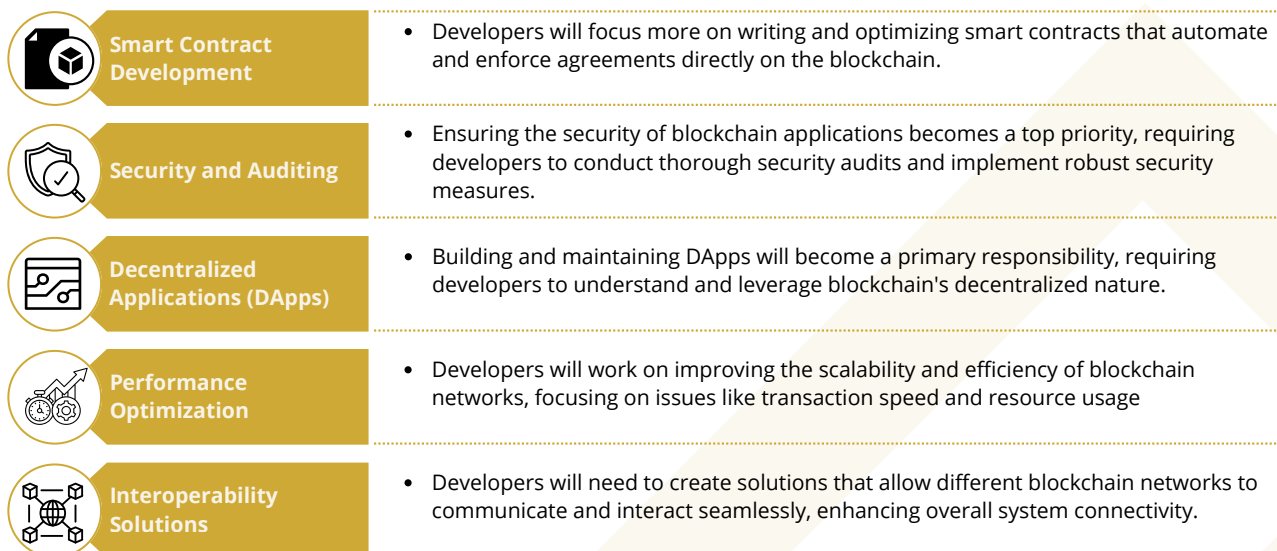


Figure 2: Exploring How Blockchain Transform Roles and Responsibilities of Developers

These transformations will require developers to continually adapt and expand their skill sets, stay informed about the latest advancements in blockchain technology, and embrace new responsibilities that come with developing secure, efficient, and compliant blockchain-based solutions.

How Blockchain Addresses Current Challenges for Software Developers

Blockchain technology can address several challenges faced by developers today. Here are some key challenges and how blockchain can offer solutions:

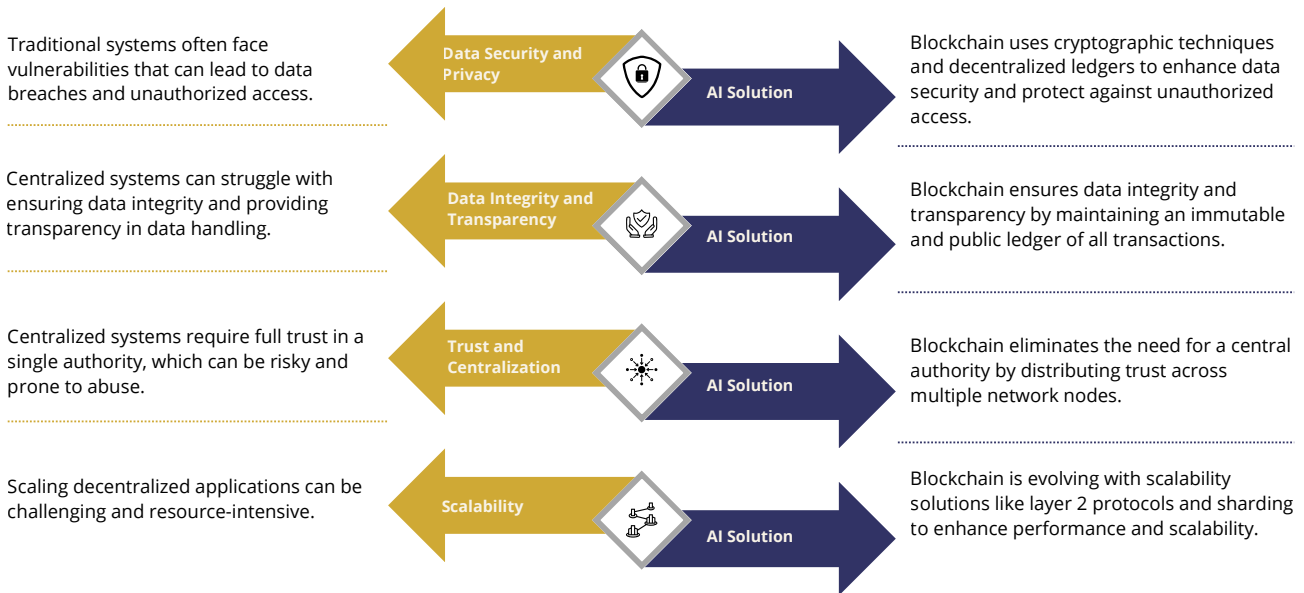


Figure 3: Blockchain Addressing Current Challenges for Developers

By leveraging blockchain technology, developers can address these challenges and build more secure, transparent, and interoperable systems.

How Industries are Adopting Blockchain in Software Development

Industries are increasingly adopting blockchain in software development to enhance workforce efficiency and employee collaboration. By integrating blockchain, organizations streamline and secure various processes such as payroll management, contract execution, and internal auditing, reducing administrative overhead and minimizing errors. Smart contracts automate and enforce agreements, enabling faster and more transparent transactions between employees and employers. Additionally, blockchain's decentralized nature fosters greater trust and accountability, as every transaction is recorded on an immutable ledger. This adoption not only boosts operational efficiency but also empowers employees with more secure and transparent work environments.

Blockchain technologies continue to hold significant promise for addressing complex business challenges and creating new opportunities in the global market. Any company can leverage blockchain's performance-enhancing capabilities, particularly in a fast-paced and dynamic commercial landscape.

How to Integrate Blockchain in Software Development Practices

Integrating blockchain into software development practices revolutionizes how data is managed, ensuring transparency, security, and immutability. By leveraging decentralized ledgers, developers can enhance trust and reduce vulnerabilities in applications. This transformative approach not only optimizes workflows but also introduces innovative solutions across various industries, from finance to supply chain.

It involves several detailed steps to ensure a successful and effective implementation:

- ✓ **Pinpoint where blockchain adds value.**
- ✓ **Select the right blockchain platform.**
- ✓ **Plan blockchain structure and interactions.**
- ✓ **Create and deploy smart contracts.**
- ✓ **Connect blockchain with existing systems.**
- ✓ **Apply strong security measures.**
- ✓ **Verify functionality and performance.**
- ✓ **Launch and monitor the solution with development team**

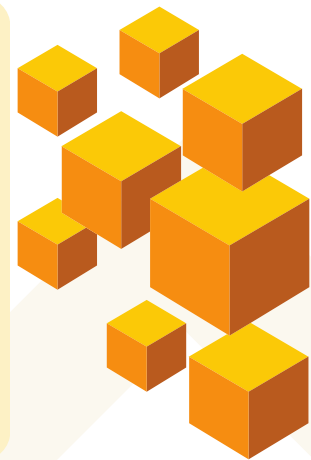


Figure 4: Key Steps to Integrate Blockchain in Software Development Practices

By following these steps, businesses can effectively integrate blockchain technology to enhance operations and achieve strategic goals.

A Brief Summary of Blockchain+ Developer Practitioner Certification

At AI CERTs, we empower organizations to unlock the potential of Blockchain with our industry-leading suite of role-based certification.

Developers aiming to build innovative blockchain solutions should dive into the Blockchain+ Developer Practitioner modules to acquire essential skills and knowledge for creating robust blockchain applications.

Module 1: Introduction to Blockchain and Smart Contracts

An introduction to blockchain and smart contracts is vital for understanding their fundamental principles and applications. Blockchain provides a decentralized and secure way to record transactions, ensuring transparency and reducing fraud. Smart contracts automate and enforce agreements without the need for intermediaries, streamlining processes and reducing costs.

In this module, you'll explore blockchain technology's principles, including its use of cryptography and decentralization. You'll learn about its evolution from cryptocurrency to applications in various industries, its secure ledger system, and consensus mechanisms like PoW and PoS. The module also covers smart contracts and decentralized applications (DApps).

Module 2: Ethereum Virtual (EVM) and Solidity Basics

Ethereum and its virtual machine (EVM) include a solid infrastructure that supports many decentralized applications, advancing blockchain technology. A decentralized network of Ethereum Virtual Machine-running nodes forms Ethereum's architecture. It performs smart contracts, self-executing agreements with coded terms, making the EVM vital.

Within this module, you'll learn about Ethereum's infrastructure, including the Ethereum Virtual Machine (EVM) and its role in supporting smart contracts. You'll explore Solidity for programming smart contracts and tools like Remix IDE for development and Metamask for managing tokens. The module covers the key features of Solidity, such as variables and loops, for creating dynamic and reliable decentralized applications.

Module 3: Real-World Use Cases and Projects

Advanced Solidity and structures are essential for developing complex and scalable Ethereum smart contracts. As applications become more sophisticated, developers need tools like libraries, interfaces, and modifiers to manage intricate logic, reuse code, and control contract behavior efficiently.

The focus of this module is on advanced Solidity features, including libraries, interfaces, and modifiers for complex smart contracts. You'll learn about data structures, contract-to-contract interactions, and Solidity 0.6.0 improvements like enhanced receive and fallback methods. The module also highlights using OpenZeppelin libraries to ensure secure and standardized contract development.

Module 4: Tokenization and NFTs

Tokenization on the Ethereum blockchain begins with knowing the ERC (Ethereum Request for Comments) standards, which govern token creation and management. As per Spherical Insights report, the global Tokenization market size is projected to touch around USD \$10.2 billion in 2032, with a progressive CAGR of 19.52% during the forecast period.

The module covers Ethereum tokenization, focusing on ERC standards. You'll learn about ERC20 for fungible tokens and ERC721 for unique NFTs. ERC20 supports token transactions and ecosystem compatibility, while ERC721 is used for distinct digital assets like art. The module also highlights NFT security and storage with IPFS and Pinata Cloud, ensuring secure, verifiable, and accessible digital assets.

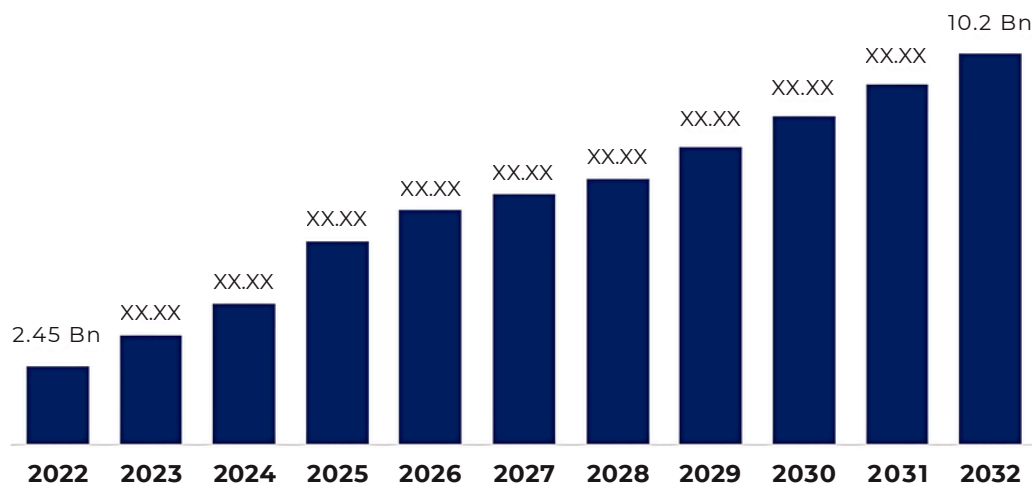


Figure 5: Global Tokenization Market (2022-2032)

Source: Spherical Insights

Module 5: Development Tools and Techniques

Development tools are crucial for blockchain to simplify smart contract creation and testing. Tools like Truffle, Ganache, and Hardhat aid in coding and debugging, while Metamask and Remix IDE facilitate account management and development.

This module dives into blockchain development tools and frameworks, including Truffle, Ganache, and Hardhat for smart contract management. You'll learn about Metamask for Ethereum account management and Remix IDE for Solidity development. The module also covers using private networks like Geth for testing applications before public deployment.

Module 6: DApp Integration and Testing

DApp integration and testing are important to ensure that decentralized applications interact seamlessly with blockchain networks and function as intended. According to Virtue Market Research report, the DApps market was calculated at USD \$25.63 billion in 2022. It is expected to grow around USD \$70.82 billion by 2030, with an impressive CAGR of 56.1% during the forecast period.

In this module, you'll learn how Web3.0 and JavaScript frameworks like Web3.js and Ethers.js improve blockchain interactions for web apps. You'll explore smart contract management and DApp integration with blockchain networks. The module also covers wallet generation and transaction management, emphasizing MetaMask for secure asset handling and DApp interaction.

Module 7: Introduction to Private Blockchains - Hyperledger Fabric

An introduction to private blockchains, specifically Hyperledger Fabric, is needed to understand how blockchain technology can be customized for enterprise use.

Within this module, you'll explore blockchain frameworks including public, private, and consortium systems. You'll learn about Ethereum, Bitcoin, and Hyperledger Fabric for enterprise applications. The module also covers consortium frameworks like Quorum and R3 Corda, and Hyperledger's ecosystem for scalable, secure solutions.

Module 8: Deep Dive into the Hyperledger Fabric

A deep dive into Hyperledger Fabric is required for understanding its architecture and capabilities in building enterprise-grade blockchain solutions. This detailed exploration reveals how Hyperledger Fabric's modular design, smart contracts, and privacy features address specific business needs.

The module highlights Hyperledger Fabric's use of Distributed Ledger Technology (DLT) and smart contracts (chaincode) for secure, automated transactions. It covers Docker and Docker Compose for consistent application development and deployment. The module also emphasizes the importance of wallets for managing cryptographic keys and connection profiles for network configuration and secure communication.

Module 9: Golang Programming for Hyperledger Fabric

Golang programming plays a key role in Hyperledger Fabric due to its efficiency, simplicity, and support for concurrent processes.

The module makes you understand about Golang programming for Hyperledger Fabric, starting with Go installation and environment configuration. It covers using IDE plugins, like those in Visual Studio Code, to enhance Golang development. You'll learn key Go concepts, including syntax, data types, and control flow.

Module 10: Chaincode Structure and Error Handling

Understanding chaincode structure and error handling is necessary for developing robust Hyperledger Fabric applications. A well-defined chaincode structure ensures smart contracts are organized and efficient, which facilitates seamless deployment and interaction on the blockchain.

In this module, you'll explore Hyperledger Fabric's Fabric Samples to understand chaincode development, deployment, and interaction. The module covers creating test networks for hands-on experience, emphasizes effective error handling practices, and explains the importance of clear error returns and efficient logging. You'll also learn to manage panics and ensure system stability while developing robust, reliable blockchain applications.

Module 11: Custom Chaincode

Custom chaincode allows for tailoring Hyperledger Fabric applications to specific business requirements. While default chaincode offers basic functionality, custom chaincode enables the implementation of unique logic and additional features needed for various use cases.

In this module, you'll learn to extend Hyperledger Fabric's default chaincode with custom features to meet specific business needs. It covers testing, packaging, and deploying custom chaincode, managing its lifecycle, and integrating it with front-end applications using REST APIs. You'll also explore data serialization, deserialization, and error handling to build scalable and adaptable blockchain applications.

Module 12: Smart Contract Auditing and Tools, Hyperledger Fabconnect, and Firefly

Smart contract auditing ensures the security and reliability of blockchain applications by identifying vulnerabilities. Tools like Hyperledger Fabconnect and Firefly streamline the development process, providing robust frameworks for secure contract deployment and interaction. Together, they empower developers to create and maintain efficient, trusted blockchain solutions in a rapidly evolving digital landscape.

This is the last module of this certification that helps you explore smart contract auditing tools and blockchain development technologies. You will examine the importance of smart contract audits for security and reliability, using tools like Slither and Solhint to enhance code quality. The module also covers blockchain development tools such as Firefly for application deployment, Fabconnect for system integration, and Blockchain Explorer for network transparency and analysis.

How Can AI CERTs Help Build an AI-Ready Culture?

Blockchain technologies come with challenges such as a lack of skilled professionals, complex data management, and integration difficulties. At AI CERTs, we recognize these issues and have designed our certifications to help organizations tackle and overcome these problems effectively.

Bridging the Blockchain Skills Gap

- **Challenge:** Developers often face challenges due to a shortage of blockchain expertise, making it difficult to grasp blockchain fundamentals, smart contract development, and decentralized applications effectively.
- **Solution:** AI CERTs certifications offer targeted training to boost developer's skills in blockchain technology. This training covers blockchain development, smart contract coding, and decentralized systems, helping developers enhance their expertise and stand out in the field.
- **Benefit:** Our certifications arm developers with the knowledge needed to build, deploy, and manage blockchain solutions, helping close the skills gap and speeding up your organization's blockchain adoption.

Enabling Every Developer with Blockchain Skills

- **Challenge:** It's tough to ensure that developers and other team members across different departments have the blockchain skills they need. Without consistent training, the potential of blockchain technology might be underused, leading to inefficiencies and missed opportunities.
- **Solution:** AI CERTs provide a range of certifications tailored to various development roles, helping all team members build a solid understanding of blockchain.
- **Benefit:** Encouraging your development team to complete these certifications cultivates a strong blockchain skill set throughout your organization. This not only boosts individual capabilities but also promotes a collaborative atmosphere, driving innovation and improving strategic outcomes with blockchain technology.

At AI CERTs, we offer a strategic solution, fostering a culture primed for Blockchain integration and innovation. Our blockchain certification programs provide comprehensive training and widely recognized credentials, essential for equipping your team and propelling your organization towards a future driven by blockchain technology.

AI CERTs Cultivate Blockchain Culture in Several Ways:

- Our structured curriculum makes blockchain concepts and applications easier to understand for students.
- Ongoing learning ensures that employees stay current with blockchain trends, providing a competitive advantage.
- AI CERTs certification fosters knowledge sharing and breaks down departmental barriers through teamwork and cross-functional collaboration, which is crucial for successful blockchain adoption.

AI CERTs: Your Pathway to Becoming Blockchain-Ready

The future of business belongs to blockchain users.

Tailored for Success: Our certifications are customized to meet your needs. Designed by industry experts, our specialized training equips your team with the precise skills required for key blockchain roles.

Actionable Expertise: Focus on practical skills rather than just theory. We emphasize hands-on learning with projects and case studies, ensuring your team gains the confidence and knowledge to effectively integrate and use blockchain technologies, driving innovation and business value.

Become a Blockchain Leader: Don't just follow the blockchain trend—lead it. Partner with AI CERTs to educate your staff and foster a blockchain-driven culture that harnesses its transformative potential to drive your company forward.



www.aicerts.ai

Contact

252 West 37th St., Suite 1200W
New York, NY 10018

