ISOM3270 - Blockchain Programming in Business Applications

Overview

The global economy is undergoing a profound digital transformation, gradually transitioning into a digital economy. This transformation signifies a comprehensive shift in how services and businesses operate, leveraging advanced technologies to replace manual processes and outdated systems. The potential of this digital transformation is immense—it can redefine customer and business expectations, create new value, and unlock broader economic and societal benefits.

In alignment with this vision, the State Council issued the "Overall Plan for the Construction of Digital China" in February 2023, which recognizes Hong Kong's strategic position as an international center for digital finance and digital assets. The plan highlights Web 3.0 as a key driver to accelerate this new economic development, signifying the critical role of digital innovations.

Against this local and global backdrop, technological advancements such as fintech, decentralized finance (DeFi), artificial intelligence (AI), the metaverse, and Web 3.0 are becoming increasingly vital. Consequently, the demand for knowledge and expertise in these transformative technologies is surging.

This course, "Blockchain Programming in Business Applications," is designed for Business School undergraduate students eager to explore this exciting frontier. You will gain a comprehensive understanding of the fundamental technologies underlying blockchain systems and the diverse applications enabled by this groundbreaking innovation.

Understanding Web 3.0

In today's world, the alignment of new productivity with new production relations is crucial for the advancement of science, technology, and the economy. If AI serves as the comprehensive engine driving current productivity development, then Web 3.0 establishes a new production relationship that enables AI to further enhance economic and social progress.

Web 3.0, the third generation of the Internet, represents not only an evolution in communication and information technology but also a paradigm shift in production relations. It facilitates the realization of value, confirms ownership, and circulates data assets, thereby redefining business and social interactions. The principle of "trust the code" underscores that the logic and data encoded within smart contracts are fundamental in determining value. This model promotes transparent, fair, and tamper-proof economic interactions, allowing value creators to maintain genuine control over their data and its realization. In essence, "data starts with productivity factors and ends with value realization."

Web 3.0 is integral to the digital economy, enhancing efficiency across various domains—from technology research and development to market expansion and supply chain management. It fosters innovative business models, enabling enterprises to connect directly with billions of digital wallet users globally. New frameworks such as universal memberships and stakeholder integration facilitate the monetization of both private and public domain traffic through confirmed data rights. Additionally, Web 3.0 enhances user privacy, establishes transparent trading relationships, and improves the traceability of supply chains, thus optimizing procurement, production, and logistics management.

As a crucial infrastructure for the digital economy, Web 3.0 injects new momentum into financial innovation, fostering a more efficient, balanced, and autonomous economic landscape. This course will also examine the significant economic and commercial benefits arising from the intersection of AI technology and Web 3.0.

Course Objectives - What You Will Learn:

- **Comprehensive Overview of Blockchain Technology**: Develop a solid foundation in blockchain principles, exploring its architecture, functionality, and transformative impact across various industries.
- Smart Contracts and Their Business Applications: Learn to create and deploy smart contracts using the Solidity programming language. Understand how these self-executing contracts can generate value from data by automating processes, reducing costs, and enhancing transparency in transactions across business applications, from supply chain management to digital assets.
- Hands-On dApp Development: Engage in practical projects where you will build and deploy your own decentralized applications in real-world environments. Discover how dApps can empower users and create value in a decentralized economy.
- Exploring Web 3.0 and Digital Assets: Delve deeper into the concepts of Web 3.0, focusing on data ownership, value realization, and the circulation of data assets as critical components of the digital economy.
- **Building Smart Businesses**: Learn how to leverage blockchain technology to create agile, transparent, and efficient smart businesses. Analyze case studies of companies successfully integrating blockchain solutions to enhance operational efficiency and drive innovation.
- **The Synergy Between AI and Web 3.0**: Explore the economic and commercial benefits generated by the intersection of AI and Web 3.0 technologies. Understand how these innovations can drive productivity and enhance the digital economy, creating unprecedented opportunities for businesses.
- Industry-Relevant Tools and SDKs: Familiarize yourself with essential tools and software development kits (SDKs) crucial in the blockchain ecosystem, equipping you with the skills that employers are actively seeking.

By equipping students with practical knowledge and industry-relevant applications of blockchain-based solutions, this course prepares you to tackle real-world problems in the emerging digital economy. Whether you aim for technical or managerial roles, you will be well-positioned to thrive in this rapidly evolving landscape.

Join us in this course and be at the forefront of the technological revolution defining the future of business! Your journey into the exciting realm of blockchain programming in business applications starts here!

Prerequisites

Basic knowledge about programming languages such as python, java or javascript recommended.

ISOM3400, ISOM 3320, COMP 1022P or COMP1021

Evaluations

Class Participation	20%
Homework	20%
Mid-term exam	20%
Course project	
Project development	20%
Project presentation	10%
Project report	10%
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IOTAI	100%

Class Format

The course will consist of two parts. The first part of the course will provide an overview of blockchain technology and a deep dive into smart contracts programming technology and development. In the process, students will learn how to write smart contracts and dApps using industry-standard development tools. In the second part of the course, we will focus on business applications and work on the course project using blockchain and smart contracts for application development to address real-world business needs. Through a series of course lectures and lab sessions, students will learn the core concepts and step-by-step build their dApp using blockchain technologies to come up with a solution to real-world problems.

Class Schedule

2 hours of lecture (1 session) + 3 hours of lab per week.

Week 1	Introduction to blockchain technology and web3.0
Week 2	Smart contracts and basic Solidity
Week 3	Development tools
Week 4	Advanced Solidity
Week 5	Connecting to the web
Week 6	dApp architecture: writing large & composable smart contracts
Week 7	Secure and efficient Solidity
Week 7 Week 8	Secure and efficient Solidity Business logic in dApp development
Week 7 Week 8 Week 9	Secure and efficient Solidity Business logic in dApp development Token economics
Week 7 Week 8 Week 9 Week 10	Secure and efficient Solidity Business logic in dApp development Token economics Scalability architecture in web3 applications
Week 7 Week 8 Week 9 Week 10 Week 11	Secure and efficient SolidityBusiness logic in dApp developmentToken economicsScalability architecture in web3 applicationsPrivacy in web3 applications