The Hong Kong Polytechnic University

Subject Description Form

Subject Code	AMA3350
Subject Title	Real World Asset Tokenization
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	The objective of this course is to introduce students with the fundamental technology, the exchange mechanism, and Oracle services that enable real-world assets (RWA) tokenization. The curriculum will cover the concept and architecture of asset tokenization (a.k.a. smart contracts), its value propositions within decentralized finance (DeFi) and its broader economic and institutional impacts. Students will learn the mathematical principles underpinning asset pricing, risk and cash flow modeling in tokenized environments. Through case studies, a guided workbook, and analysis of current industry practices, students will develop both theoretical understanding and practical insight into the trends and challenges shaping tokenized asset markets.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) Explain the evolution of decentralized ledger technology into an integrated infrastructure for asset tokenization; b) Identify and construct the key components required for designing tokenized asset contracts, including Oracle services and platform administration; c) Evaluate the value propositions and inherent risks associated with tokenized asset products and their trading environments; d) Compute and interpret quantitative measures such as gas fees, trade-dependent asset pricing, and liquidity-sensitive transaction costs; e) Analyze lesson learned from pilot tokenization projects and major system exploits of the past decade to understand vulnerabilities and resilience; f) Recognize and articulate the major technical and governance challenges in enhancing trust, transparency, and scalability within tokenized financial ecosystems
Subject Synopsis/ Indicative Syllabus	This course provides a comprehensive overview of real-world asset tokenization as an emerging discipline linking digital ledger technologies with financial market operations. It examines the full life cycle of tokenized contracts—from issuance and trading to risk management—within exchange-based systems. Main topics include: - Overview and taxonomy of asset tokenization - Enabling technologies and on/off-chain infrastructure - Stakeholders and ecosystem architecture - Governance and regulatory frameworks under legal and industry bodies

- Exchange platform design and administration
- Automated Market Makers (AMMs) and exchange mathematics
- Pricing, yield, and cash flow modeling
- Risk simulation and default modeling
- Industry applications, trends, and emerging challenges

Students will engage with real-world case studies and develop simple prototypes of RWA tokenized contracts integrated into simulated exchange environments to assess execution efficiency, liquidity behavior, and pricing consistency.

Teaching/Learning Methodology

Lectures:

Foundational concepts of real-world asset (RWA) contracts will be established through structured lectures, enriched with practical code examples and architectural diagrams to illustrate key principles.

Tutorials:

Interactive sessions will bridge theory and practice by examining RWA contract projects. Through guided discussions and case study analysis, students will deconstruct existing contracts and explore their design patterns and security considerations.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d	e	f
1. In-tutorial quiz	10%	✓		✓	✓		✓
2. Case study (presentation, written report)	50%		✓	✓	✓	✓	✓
3. Exam	40%	✓	✓	✓	✓	✓	✓
Total	100 %						

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

<u>In-tutorial Quiz</u>:

Students will complete short quizzes and discuss applied scenarios during tutorial sessions. They are expected to participate actively and demonstrate their understanding and perspectives on the related sub-topics.

<u>Case study:</u>

Students will conduct an evaluation of a selected real-world application of asset tokenization, focusing on its functional design, pricing and risk modeling, operational vulnerabilities, and long-term sustainability.

Each student (or group) will:

- Analyze a given tokenization architecture, token economics, and platform structure;

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- Evaluate the adequacy of its pricing and risk mechanisms given market and liquidity constraints;
- Identify potential technical, governance, and regulatory vulnerabilities;
- Discuss the sustainability of the model in practical deployment scenarios.

Assessment will be based on both an oral presentation and a written report, demonstrating the student's analytical ability, critical reasoning, and understanding
of the tokenized asset ecosystem.

<u>Examination:</u>

A written examination will assess students' overall comprehension of the course topics. The exam format may include a mix of multiple-choice questions, short questions, or long questions. Students are expected to demonstrate their understanding of tokenization fundamentals, pricing logic, risk factors, and platform operations through clear, logical, and well-supported responses.
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<tr><td rowspan="7">Student Study Effort Expected</td><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture</td><td>26 Hrs.</td></tr>
<tr><td>▪ Tutorial</td><td>13 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Self-learning from reference materials</td><td>30 Hrs.</td></tr>
<tr><td>▪ Reading and research for the case study</td><td>36 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>105 Hrs.</td></tr>
<tr><td>Reading List and References</td><td colspan="2">

[1] 2024: The year of Institutional Real World Asset Tokenization
https://investax.io/blog/2024-real-world-asset-tokenization-market-recap

[2] Introduction to Smart Contracts
https://docs.soliditylang.org/en/latest/introduction-to-smart-contracts.html

[3] Jean G, (2023) Cross-Chain Interoperability in DeFi: Architectures for Seamless and Secure Multi-Blockchain Transactions
https://www.researchgate.net/publication/392967924_Cross-Chain_Interoperability_in_DeFi_Architectures_for_Seamless_and_Secure_Multi-Blockchain_Transactions

[4] Ferreira, A. (2020). Emerging regulatory approaches to blockchain based token economy. Journal of The British Blockchain Association, 3(1), 1-9.
https://doi.org/10.31585/jbba-3-1-(6)2020

[5] Loannou I., Demirel G., (2022). Blockchain and supply chain finance: a critical literature review at the intersection of operations, finance and law. Journal of Banking and Financial Technology
https://link.springer.com/article/10.1007/s42786-022-00040-1

[6] Monrat, A. A., Schelen, O., & Andersson, K. (2019). A Survey of Blockchain From the Perspectives of Applications, Challenges, and Opportunities. IEEE access, 7, 117134-117151.
https://doi.org/10.1109/ACCESS.2019.2936094

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	[7] Tsiulin, S., Kristian Hegner, R., Hilmola, O.-P., Goryaev, N., & Karam, A. (2020). Blockchain-based applications in shipping and port management: a literature review towards defining key conceptual frameworks. International journal of commerce and management, 30(2), 201-224. https://doi.org/10.1108/RIBS-04- 2019-0051 [8] The maker foundation. https://makerdao.com/en/, 2019. [9] Ethereum Gas and Fees https://ethereum.org/developers/docs/gas/ [10] Fabian Schär. Decentralized finance: On blockchain-and smart contract-based financial markets. Federal Reserve Bank of St. Louis Review, 2021. https://www.stlouisfed.org/publications/review/2021/02/05/decentralized-finance-on-blockchain-and-smart-contract-based-financial-markets