FIN547 Blockchain Technologies: Applications and Challenges

Level: 5
Credit Units: 5 Credit Units
Language: ENGLISH
Presentation Pattern: EVERY JULY

Synopsis:

FIN547 Blockchain Technologies: Applications and Challenges helps students to acquire a technical understanding of how blockchain works and how it can be used to address real-world problems. The course
starts with an overview of the blockchain technology and cryptocurrencies, followed with technical protocols, tools, and processes that enable decentralization and the adoption of bitcoin. The course analyses
the bitcoin mechanism (blocks, mining, distributed consensus, and P2P network) and ecosystem (hard/soft forks, wallets, and exchanges). It then looks at other distributed consensus mechanisms, where other
cryptocurrencies ("Altcoin") like Ethereum, smart contracts, Decentralised Autonomous Organisations ("DAOs"), sidechains, and blockchain interoperability are examined. The latter part of the course focuses
on case studies, hands-on experience and projects, in order to help students form a critical understanding of how blockchain technologies can be applied to both financial and nonfinancial areas, as well as the
challenges and questions that still need to be addressed.

Overall, the course is aimed at providing technical foundation underlying blockchain and digital currencies, and equipping students with tools and mindsets to design and develop on the blockchain and provide innovative solutions to real-world issues.

Topics:
- Introduction to blockchain technology and cryptocurrencies: history and the present
- Technical protocols, tools, and processes: cryptographic hashes, encryption, digital signatures, hash chains and Merkle trees
- Bitcoin mechanism: blocks, mining, distributed consensus, proof-of-work, P2P network, SPV nodes, and bitcoin scripting
- Bitcoin ecosystem: fungibility, hard/soft forks, wallets, exchanges, mining pools and centralization, regulation, and security
- Interacting with bitcoin ecosystem: pegged sidechains, private blockchains, data layers, etc.
- Other cryptocurrencies and alternative distributed consensus mechanisms
- Ethereum, Smart contract, and DAOs
- Case studies: blockchain start-ups, applications, and alternative platforms
- Coding and developing applications on blockchain platforms
- Blockchain technology's challenges: scalability and usability
- Blockchain technology's challenges: privacy, identity, and ethical issues
- Possible solutions to the challenges and the future of blockchain technology

Textbooks:

: Handbook of Blockchain, Digital Finance, and Inclusion, Academic Press Academic Press
ISBN-13: 9780128122822

: Handbook of Blockchain, Digital Finance, and Inclusion, Academic Press Academic Press
ISBN-13: 9780128122822-AA

: Inclusive FinTech: Blockchain, Cryptocurrency and Initial Crypto-Token Offering World Scientific
Publishing
ISBN-13: 9789813272767-AA

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Learning Outcome:
- Appraise the development of blockchain technology, its challenges and possible solutions
- Examine technical protocols, tools, and processes underlying bitcoin mechanism and ecosystem
- Assess altcoins especially Ethereum, Smart Contracts, and DAOs
- Evaluate existing major blockchain applications
- Develop and code applications on blockchain platforms
- Design solutions based on blockchain technologies to address real-world issues

Assessment Strategies:

Continuous Assessment Component	Weightage (%)
PARTICIPATION	10
GROUP BASED ASSIGNMENT	40
Sub-Total	**50**

Examinable Component	Weightage (%)
ECA	50
Sub-Total	**50**

Weightage Total   **100**