Subject Description Form

Subject Code	COMP5568
Subject Title	Decentralized Finance
Credit Value	3
Level	5
Pre-requisite	COMP5521 Distributed Ledger Technology, Cryptocurrency and E-Payment
Co-requisite	COMP5565 Decentralized Apps Fundamentals and Development
Objectives	The objectives of this subject are to: 1. describe the basic concepts and principles of traditional finance 2. compare intermediated and decentralized finance (DeFi) systems 3. explore various privacy technologies and their applications in DeFi 4. study attacks on DeFi and ways to strengthen DeFi security
Intended Learning Outcomes *(Note 1)*	Upon completion of the subject, students will be able to: <u>Professional/academic knowledge and skills</u> a) explain how various DeFi operations and objects are constructed and operate from a technical and financial perspective b) critically evaluate whether a new DeFi protocol is novel and practical c) identify threats on DeFi protocols and propose solutions <u>Attributes for all-roundedness</u> d) acquire critical thinking and analytical skills, and improve technical writing as well as presentation skills

Subject Synopsis/ Indicative Syllabus

(Note 2)

Topic	Duration (hr)
1. Introduction to Decentralized Finance (DeFi) The world of blockchain and multichains, the DeFi stack, actors, services, a glimpse of new paradigms, flash loans, risks, security, and privacy.	3
2. Smart contracts for DeFi Cryptocurrencies, smart contracts, Solidity, fungible and non-fungible tokens, Decentralized Autonomous Organization (DAO), and governance tokens. Lab: DAO	6
3. Introduction to finance Stocks, bonds, insurance, contracts, regulators, spillovers, externalities, trade, risk, incentives, market, fin1ncial instruments, investments, trades, hedge funds, liquidity, portfolios, fiat currencies, collateral, banks, central bank reserves, leverage, broker, exchange, functions of money.	4.5
4. DeFi actors and protocols Oracles, brokers, bridges, governance, regulators, investment, centralized/decentralized exchanges, order book, liquidity pool, automated market maker, wrapped coin, pegged asset, stable coin, flash loans, token exchanges, arbitrage, liquidity mining, aggregators, lending, borrowing, leverage, collateralization, liquidation, auction, trading, synthetics, derivatives, asset management, asset tokenization, non-fungible tokens, exchange traded funds, asset management protocols. Tutorial: Case studies Labs: Building and analyzing DeFi protocols	15
5. Privacy and security Privacy and decentralized identities, zero-knowledge proofs, anonymous payments, mixers, anonymous credentials, decentralized identifiers, oracles, technical and economic security, front-running, composability attacks, code security, miner extractable value, privacy, exit scams. Lab: Analyzing smart contracts	7.5
6. Regulations Regulatory risks, liability, ICO, US and HK laws, compliance.	3
Total	**39 hours**

<table>
<tr><td>Teaching/Learning Methodology
(Note 3)</td><td>39 hours of class activities, including lectures, lab(s), and seminar(s) where applicable. Experts, practitioners and industry partners shall be invited to deliver Guest lectures to discuss practical aspects of decentralized finance.
There will be a mix of lectures, discussions and case study analysis. Recent research articles and white papers on decentralized finance technologies and products will be reviewed and discussed in lectures.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes
(Note 4)</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="4">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>1. Quizzes</td><td>25</td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td>2. Assignments, Labs & Projects</td><td>30</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>3. Final Examination</td><td>45</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="4"></td></tr>
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Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Quizzes and assignments are traditional ways for the instructor to measure students’ ability in technical writing and understand the subject content. Labs allow students to practice and provide ways to access students’ practical capabilities. Projects allow the teamwork component to be measured, and at the same time provide a way to assess students’ presentation skill and ability to put what have been learnt on a larger scale. Examination will assess and evaluate the student's overall understanding of the subject.
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Student Study Effort Expected	Class contact:	
	▪ Lectures & Tutorials/Labs	39 Hrs.
	▪	Hrs.
	Other student study effort:	
	▪ Self-study, assignment, project, exam	66 Hrs.
	▪	Hrs.
	Total student study effort	105 Hrs.
Reading List and References	1. Werner, S. M., Perez, D., Gudgeon, L., Klages-Mundt, A., Harz, D., & Knottenbelt, W. J. (2021). SoK: Decentralized finance (DeFi). arXiv preprint arXiv:2101.08778. 2. Xu, J., Paruch, K., Cousaert, S., & Feng, Y. (2021). SoK: Decentralized exchanges (DEX) with automated market maker (AMM) protocols. arXiv preprint arXiv:2103.12732. 3. Clark, J., Demirag, D., & Moosavi, M. (2019). SoK: Demystifying stablecoins. Communications of the ACM, Forthcoming. 4. Qin, K., Zhou, L., Livshits, B., & Gervais, A. (2021, March). Attacking the defi ecosystem with flash loans for fun and profit. In International Conference on Financial Cryptography and Data Security (pp. 3-32). Springer, Berlin, Heidelberg. 5. Klages-Mundt, A., & Minca, A. (2019). (In) stability for the blockchain: Deleveraging spirals and stablecoin attacks. arXiv preprint arXiv:1906.02152.	