Subject Description Form

Subject Code	DSAI4202
Subject Title	E-Payment and Cryptocurrency
Credit Value	3
Level	4
Pre-requisite / Co-requisite / Exclusion	**Pre-requisite**: COMP3334
Objectives	To understand the technologies and applications for e-payment and cryptocurrency. Specifically, the students should: 1. understand fundamental security technologies for supporting e-payment and cryptocurrency; 2. evaluate different types of payment methods; and 3. understand the design and application of e-payment and cryptocurrency systems.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: *Professional/academic knowledge and skills* (a) acquire a fundamental understanding of cryptocurrency and e-payment – the basic principles as well as the technical and business aspects; (b) evaluate cryptocurrency and e-payment systems, applications and protocols; (c) design and implement cryptocurrency and e-payment systems/applications; *Attributes for all-roundedness* (d) follow trends of e-payment and crypto-currency; and (e) acquire critical thinking and analytical skills, and improve technical writing as well as presentation skills.

Subject Synopsis/ Indicative Syllabus	**Topic** **1. Introduction** Payment fundamentals; Different types of payment; Regulatory issues. **2. Security Fundamentals** Review of security mechanisms (encryptions, digital signatures, hash functions, authentication protocols, digital certificate, Internet security). Elliptic curve cryptography (ECDLP, ECDSA); recent hash functions (SHA- 256, RIPEMD-160) **3. Internet Payment Systems** SET and 3D credit card payment protocols; Electronic check; E-cash; Internet payment services. **4. Mobile Payment Systems** Smart card payment; Apple Wallet; Google Wallet; Other mobile payment systems. **5. Cryptocurrency** Block chain; Bitcoin (ant its variants, e.g. Litecoin); Other crypto-currency systems (e.g. Ethereum, Monero, ZCash). **6. Related Topics** Legal issues; Advanced/emerging technologies; Case studies. <u>Laboratory Experiments:</u> Laboratory exercises on blockchain, cryptocurrency and e-payment. <u>Case Studies:</u> Case studies on blockchain, Bitcoin, Internet/mobile payment systems.
Teaching/ Learning Methodology	Teaching is mainly conducted through lectures. Learning is supplemented by exercises in labs/tutorials. Students are assessed through assignments, a project, a mid-term test and an examination.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
Continuous Assessment						
1. Assignments	**55%**	✓	✓		✓	
2. Project		✓	✓	✓	✓	✓
3. Mid-Term Test		✓	✓			
Examination	**45%**	✓	✓		✓	
Total	100 %					

Continuous assessments consist of assignments, a project and a mid-term test, which are designed to facilitate students to achieve the intended learning outcomes. The project is used to assess all learning outcomes. It is designed to enhance students' ability to a deeper understanding of a problem of a larger-scope and solving it systematically. Examination will provide a summative evaluation of the overall ability and understanding of the subject (i.e., e-payment and cryptocurrency).

Student Study Effort Expected

Class contact:	
▪ Class activities (lecture, tutorial, laboratory, etc.)	39 Hrs.
Other student study effort:	
▪ Self-study and other related work	66 Hrs.
Total student study effort	105 Hrs.

Reading List and References	**Reference Books:** 1. Narayanan, A., Bonneau, J., Felten, E., Miller, A. and Goldfeder, S., *Bitcoin and Cryptocurrency Technologies*, Princeton University Press, 2016. 2. Liébana-Cabanillas, Francisco, *Electronic Payment Systems for Competitive Advantage in E-Commerce*, IGI Global, 2014. 3. Nakajima, Masashi, P*ayment System Technologies and Functions: Innovations and Developments*, IGI Global, 2011. 4. Tapscott, Alex and Tapscott, Don, *Blockchain Revolution: How the Technology Behind Bitcoin is Changing Money, Business, and the World*, Portfolio, 2016. 5. Vigna, Paul and Casey, Michael J., *The Age of Cryptocurrency: How Bitcoin and the Blockchain Are Challenging the Global Economic Order*, Picador, 2016. 6. Antonopoulos, Andreas M., M*astering Bitcoin: Unlocking Digital Cryptocurrencies*, O'Reilly, 2014. 7. Stallings, W., C*ryptography and Network Security: Principles and Practice*, 7th Edition, Prentice Hall, 2017. 8. Mostafa Hashem Sherif, Protocols for Secure Electronic Commerce, ISBN 9781138586055, CRC Press, 2018.