Subject Description Form

Subject Code	COMP5140
Subject Title	Metaverse Fundamentals
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	The objectives of this subject are to: 1. provide students with an in-depth and systematic view of the Metaverse and the enabling technologies; 2. equip students with the interdisciplinary knowledge to understand the theories of the design of Metaverse platforms and applications and apply these theories in practice; 3. equip students with the skills in implementing and engineering Metaverse applications using the latest and de-facto standard technologies; and 4. nurture students' humanistic thinking in the design and implementation of Metaverse applications.
Intended Learning Outcomes *(Note 1)*	Upon completion of the subject, students will be able to: a) understand the enabling technologies and existing solutions systematically; b) have a deep understanding of the major theories that influence the design of Metaverse platforms and applications; c) apply the theories appropriately to design Metaverse applications which address real-world problems innovatively; d) implement and engineer Metaverse applications using the latest and de-facto standard technologies effectively; e) understand the latest developments and challenges in the industry.
Subject Synopsis/ Indicative Syllabus *(Note 2)*	**Background and the Emergence of the Metaverse** Computer-mediated communication; avatar-mediated communication; the history and roadmap of the Metaverse; the ecology of the Metaverse; the interdisciplinary nature of the Metaverse. **Metaverse Technologies**

	Virtual reality; computer graphics; cryptography, blockchain, and smart contract; infrastructure and networking; avatar and agent; virtual human; digital twins; 3D reconstruction and photogrammetry; procedural generation; sensor technologies; language processing, data and machine learning, AI in the Metaverse.
	Design Theories and Practices
	Social presence and copresence; the sense of self-location; the sense of agency; the sense of body ownership; motion sickness and cybersickness; uncanny valley; cross-platform user experience design; universal simulation principle; spatial user interface design; prototyping; qualitative and quantitative evaluation techniques.
	Exemplary Applications Solutions
	Entertainment applications; education applications; co-work and collaboration applications; comparisons with conventional solutions; overview of existing platforms.
	Latest Developments and Challenges
	Persistency and interoperability; usefulness and ease-of-use; privacy and data security; content creation and creator economy; ethical issues; inclusive and accessible Metaverse; law and jurisdiction in the Metaverse.
Teaching/Learning Methodology *(Note 3)*	*Lectures, Tutorials, and Labs*
	The subject material will be delivered through lectures, tutorials, and labs. Lectures will cover the main body of the subject materials. Guest lectures from the industry will be invited to introduce the latest developments and challenges from the perspective of the industry. Tutorials and labs will provide students with know-how in implementing and engineering Metaverse applications using the latest and de-facto standard technologies.
	Group Project and Individual Assignments
	The group project and individual assignments will provide students with in-depth opportunities to practice the theories and concepts delivered via the lecturers, as well as to assess their ability to apply these theories and concepts in practical scenarios.
	Examination
	The final examination and tests will assess students' grasp of the subject materials.

Assessment Methods in Alignment with Intended Learning Outcomes *(Note 4)*	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
			a	b	c	d	e
	1. Group project and individual assignments	55%	✓	✓	✓	✓	✓
	2. Examination	45%	✓	✓	✓		✓
	Total	100 %					

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

The individual assignments and examination will assess students' ability to understand and describe the relevant theories and concepts that influence the design of Metaverse platform and applications, as well as their ability to apply the theories appropriately to design Metaverse applications which address real-world problems innovatively. The individual assignments will also assess students' understanding of the latest development and challenges in the industry after hearing guest lectures from the industry.

The group projects will require students to demonstrate their ability to implement and engineer Metaverse applications using the latest and de-facto standard technologies effectively.

Student Study Effort Expected	Class contact:	
	▪ Lectures	26 Hrs.
	▪ Tutorials and Labs	13 Hrs.
	Other student study effort:	
	▪ Group project, individual assignments, and examination	66 Hrs.
	Total student study effort	105 Hrs.

Reading List and References	• The Metaverse Roadmap: https://www.metaverseroadmap.org/overview/ • Newzoo Trend Report 2021 – Intro to the Metaverse https://newzoo.com/insights/trend-reports/newzoo-intro-to-the-metaverse-report-2021-free-version

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