Subject Description Form

Subject Code	EIE573
Subject Title	Mobile Edge Computing
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Students are expected to have some basic knowledge in wireless communication and mobile computing. Extra materials will be provided for self-learning for those who do not have the appropriate knowledge. Please contact the subject lecturer for details.
Objectives	1. To introduce fundamental concepts and design principles of mobile edge computing (MEC), as well as supporting technologies. 2. To introduce MEC hardware platforms and standardization. 3. To introduce applications that are enabled by MEC.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: <u>Category A: Professional/academic knowledge and skills</u> a. To understand the basic architecture and benefits of MEC. b. To understand computation offloading, joint communication and computation resource management for MEC. c. To understand standardization and use scenarios of MEC. <u>Category B: Attributes for all-roundedness</u> d. Communicate effectively. e. Think critically and creatively. f. Assimilate new technological development in related field.
Subject Synopsis/ Indicative Syllabus	1. <u>MEC Basics</u>: Key features of MEC; Mobile Cloud Computing vs. MEC; Advantages of MEC; Market and ecosystem of MEC. 2. <u>Wireless Communication for MEC</u>: Wireless channel models; Cellular network structure; multiuser communication systems; basics of 5G networks. 3. <u>Computation Basics for MEC</u>: Mobile computing; Computation task models; Virtual machine; CPU/GPU computing platforms. 4. <u>Computation Offloading</u>: Different offloading modes; single-user offloading, multi-user offloading. 5. <u>Communication and Computation Resource Management</u>: Joint radio and computation resource allocation; MEC server scheduling; Multiuser cooperative edge computing. 6. <u>MEC hardware platform, standardization</u>: MEC network architecture; Standardization of MEC in 5G; Security and privacy issues in MEC. 7. <u>MEC application scenarios</u>: Video stream analysis, Internet of Things; AR/VR; Internet of Vehicles; edge AI.

Teaching/Learning Methodology

The basic features and architecture of MEC will be described and explained in lectures. Supporting techniques, including computation offloading, communication and computation resource management, will be presented in lectures and tutorials. The standardization and use scenarios of MEC will be introduced in lectures. Students will also be required to study one technical problem or application case of MEC, share their findings with other classmates through presentations and write a report summarizing their findings.

Teaching/Learning Methodology	Intended Subject Learning Outcomes					
	a	b	c	d	e	f
Lectures / Tutorials	✓	✓	✓		✓	
Mini-Project				✓		✓

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. Assignments	30%	✓	✓	✓		✓	✓
2. Test	40%	✓	✓	✓			
3. Mini-project	30%				✓		✓
Total	100%						

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

Assignments and test let students review the taught materials, do further reading for deeper learning and apply the learnt materials to solving practical problems in MEC systems.

Mini-project requires the student to do further reading, search for information, keep abreast of current development, give presentations and write a report.

Student Study Effort Expected

Class contact:	
▪ Lectures/Tutorials	36 Hrs.
▪ Test	3 Hrs.
Other student study effort:	
▪ Self-study	66 Hrs.
Total student study effort	105 Hrs.

Reading List and References

1. *Multi-Access Edge Computing in Action*, by Dario Sabella, Alex Reznik, Rui Frazao, CRC Press, 2019, ISBN: 978-0367173944.
2. *Edge Computing: A Primer*, by Jie Cao, Quan Zhang, Weisong Shi, SpringerBriefs in Computer Science, 2018, ISBN 978-3-030-02082-8.
3. Y. Mao, C. You, J. Zhang, K. Huang, and K. B. Letaief, "A survey on mobile edge computing: The communication perspective," *IEEE Commun. Surveys Tuts.*, vol. 19, no. 4, pp. 2322-2358, 4th Quart. 2017.
4. W. Shi, J. Cao, Q. Zhang, Y. Li, and L. Xu, "Edge computing: Vision and challenges," *IEEE Internet Things J.*, vol. 3, no. 5, pp. 637–646, Oct. 2016.
5. Z. Zhou, X. Chen, E. Li, L. Zeng, K. Luo, and J. Zhang, "Edge intelligence: Paving the last mile of artificial intelligence with edge computing," *Proc. IEEE*, vol. 107, no.

8, pp. 1738–1762, Aug. 2019.
6. J. Zhang and K. B. Letaief, “Mobile edge intelligence and computing for the Internet of Vehicles,” *Proc. IEEE*, vol. 108, no. 2, pp. 246–261, Feb. 2020.