Subject Description Form

Subject Code	EE4019 / EE4019B
Subject Title	Intelligent Transportation Systems
Credit Value	3
Level	4
Pre-requisite/ Co-requisite/ Exclusion	Pre-requisite for EE4019: EE2029 or EEE2003 Pre-requisite for EE4019B: EE2029B
Objectives	1. To introduce advance technologies and showcase their applications in transport systems. 2. To provide a sound understanding of the challenges that arise in transport operations which require technologies of various characteristics. 3. To enable evaluation of appropriate methodologies and be aware of the design and implementation issues associated with advanced technologies.
Subject Intended Learning Outcomes	Upon completion of the subject, students should be able to: a. Demonstrate comprehension of the issues related to transport operations. b. Explain the ways in which information and communications technology are used to tackle transport challenges. c. Recognise and identify the basic design considerations of intelligent transport systems.
Subject Synopsis/ Indicative Syllabus	1. ***Data Sources and Data Processing***: Introduction to the data requirements, collection methods, and utilisation in transport systems. 2. ***Traveller Information Systems***: Understanding the benefits of providing information to travellers, including estimating and predicting travel times. 3. ***Traffic management with ITS***: Applications of ITS in managing traffic on motorways and arterial roads, such as ramp metering, variable speed limits, electronic toll collection, public transport priority, emergency vehicle pre-emption, and incident detection. 4. ***Artificial Intelligence (AI) applications in traffic management***: Applications of the latest advancements in using machine learning to predict traffic patterns and reinforcement learning to control traffic. 5. ***Connected Autonomous Vehicles and Cooperative ITS***: Introduction to the future of transportation with connected autonomous vehicles and the use of vehicle-to-vehicle, vehicle-to-infrastructure, and vehicle-to-everything (V2X) communication to enhance safety and efficiency.

Teaching/Learning Methodology

Delivery of the subject is mainly through formal lectures and complemented by tutorials. Assignment provides students hands-on experience in processing and analysing big-data, while report-writing enables students to practise writing skill.

Teaching/Learning Methodology	Outcomes		
	a	b	c
Lectures	✓	✓	✓
Tutorials	✓	✓	✓
Assignment			✓

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Written Examination	40%	✓	✓	✓
2. Continuous Assessment	20%	✓	✓	✓
3. Assignment	40%			✓
Total	100%			

The examination provides an evaluation of outcomes related to principles, techniques, design, and application, which is further supported by continuous assessments. In contrast, assignments offer students the opportunity to investigate and apply data analytics to big data, as well as assess and critique the performance of transportation systems.

Student Study Effort Expected

Class contact:	
▪ Lecture/Tutorial	39 Hrs.
Other student study effort:	
▪ Assignment	30 Hrs.
▪ Self-study	38 Hrs.
Total student study effort	107 Hrs.

Reading List and References

Reference books:

1. US DoT, ITS ePrimer, ITS Joint Program Office, www.pcb.its.dot.gov/eprimer/
2. PIARC, Cooperative Vehicle Highway Systems, Technical Committee 2.1 Road Network Operations, 2016.
3. R. Gordon, Intelligent Transportation Systems: Functional Design for Effective Traffic Management, Springer, 2016.