Subject Description Form

Subject Code	EIE2108
Subject Title	Fundamentals of Internet and Multimedia Technologies
Credit Value	3
Level	2
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	1. To introduce the latest development of Internet and Multimedia Technologies (IMT) and their relationship with the society development. 2. To introduce the common mathematical and programming tools used in the study of IMT.
Intended Learning Outcomes	**Upon completion of the subject, students will be able to:** Category A: Professional/academic knowledge and skills 1. understand the latest development of IMT; 2. understand the common mathematical tools used in the study of IMT; 3. apply computer programming techniques to solve practical scientific problems; and Category B: Attributes for all-roundedness 4. solve problems independently.
Subject Synopsis/ Indicative Syllabus	1. Introduction to IMT a) Digital transformation of the multimedia industry b) Digital right management. Digital Entertainment Content Ecosystem (DECE) c) Overview of modern multimedia technologies: Audio, image, video, streaming, virtual reality / augmented reality, gaming, artificial intelligence 2. Mathematical Foundations of IMT a) Calculus: Differentiation, partial derivatives, chain rule, maxima and minima. Review of integration. Case study: Optimization using differentiation b) Signals and systems: Complex number, the Euler theorem, time and frequency, Fourier transform, sampling theorem, discrete Fourier transform. Case study: Real life application of discrete Fourier transform c) Linear algebra: Review of basic matrix operations. Determinants and systems of linear equations. Inner product and orthogonality, eigenvalues and eigenvectors. Case study: Real life application of linear algebra. 3. Scientific programming for IMT a) Python programming for scientific problems b) Introduction of Python specialized modules for numerical computation (e.g. Numpy, Scipy, Matplotlib, etc.)

Teaching/Learning Methodology

Teaching and Learning Method	Intended Subject Learning Outcome	Remarks
Lectures	1,2,3	Fundamental principles and key concepts of the subject are delivered to students.
Tutorials	1,2,3	Supplementary to lectures: Students will be able to clarify concepts and to have a deeper understanding of the lecture materials; Problems and applications are given and discussed.
Laboratory sessions	2,3,4	Students will experience the applications of different mathematical tools by means of some computer programming experiments in numerical computation.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
		1	2	3	4
1. Continuous Assessment (100%)					
• Tests	40%	✓	✓	✓	✓
• Short quizzes and assignments	20%	✓	✓	✓	
• Laboratory sessions/projects	40%		✓	✓	✓
2. Examination	0%	✓	✓	✓	✓
Total	100%				

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

Specific Assessment Methods/Tasks	Remark
Short quizzes and assignments	They can measure the students' understanding of the theories and concepts as well as their comprehension of subject materials.
Tests and examination	End-of-chapter-type problems are used to evaluate the students' understanding of subject materials and the ability in applying concepts and skills learned in the classroom. Students need to think critically and to learn independently in order to come up with an alternative solution to an existing problem. They need to present their solutions logically and systematically in the tests and the examination.
Laboratory sessions	Students are required to make a demonstration of their solutions on a selected open-ended question in each laboratory session for evaluating their problem solving skill. Students also need to submit lab reports for evaluating their overall performance in the laboratory sessions.

Student Study Effort Expected		
	Class contact (time-tabled):	
	• Lecture	24 Hours
	• Tutorial/Laboratory/Practice Classes	15 hours
	Other student study effort:	
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes/examination	36 Hours
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours
	Total student study effort:	**105 Hours**

Reading List and References

References:

1. S. Banerjee, *Elements of Multimedia*, Chapman and Hall/CRC. 2019.
2. Lanham, *Para-interactivity and the Appeal of Television in the Digital Age*, Lexington Books, 2017.
3. M.J. Roberts, *Fundamentals of Signals & Systems*, McGraw-Hill, 2008.
4. R. Larson, Edwards, B. *Single Variable Calculus*, Brooks/Cole 2012
5. R. Larson, *Elementary Linear Algebra*, Brooks/Cole 2013
6. S. Nagar, Introduction to Python for Engineers and Scientists: Open Source Solutions for Numerical Computation, Apress, 2018

Last Updated	July 2020
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