City University of Hong Kong
Course Syllabus

offered by Department of Electrical Engineering
with effect from Semester A in 2024/2025

Part I Course Overview

Course Title:	Advanced Topics in Applied Electromagnetics
Course Code:	EE5435
Course Duration:	One Semester (13 weeks)
Credit Units:	3
Level:	P5
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	Nil
Precursors: *(Course Code and Title)*	EE3109 Applied Electromagnetics, or other related courses.
Equivalent Courses: *(Course Code and Title)*	Nil
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

This course aims to provide new and developing areas of knowledge in applied electromagnetics to augment the existing curriculum. Depending on the topics, theoretical, experimental and/or computational aspects will be covered. Topics include, but not limited to, millimeter-wave and terahertz circuits and devices; millimeter-wave and terahertz antenna design, fabrication and measurement; terahertz science and technology; metamaterials and metasurfaces; computational electromagnetics; and electromagnetic compatibility.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs	Weighting (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	*A2*	*A3*
1.	Describe fundamental concepts in selected topics in applied electromagnetics		✓		
2.	Demonstrate practical skills on the selected topics in applied electromagnetics		✓		
3.	Describe the latest research trends in the selected topics in applied electromagnetics		✓		
		100%			

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: *Accomplishments*
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

3. Learning and Teaching Activities (LTAs)

(LTAs designed to facilitate students' achievement of the CILOs.)

LTA	Brief Description	CILO No.						Hours/week (if applicable)
		1	2	3				
Lecture	Explain key concepts in the selected topics in applied electromagnetics	✓	✓	✓				3 hrs/wk (*Some of the lectures in the form of tutorials can be conducted in the laboratory.)*
Mini-project (Optional)	Conduct projects on applied electromagnetics	✓	✓	✓				

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.						Weighting	Remarks
	1	2	3					
Continuous Assessment: 50 %								
Tests (min.: 1)	✓	✓					25%	
#Assignments (min.: 3)	✓	✓	✓				15%	
Lab Exercises/Reports	✓	✓	✓				10%	
Examination: 50% (duration: 2 hrs, if applicable)								
Examination	✓	✓	✓				50%	
							100%	

Remark:

To pass the course, students are required to achieve at least 30% in course work and 30% in the examination. Also, 75% laboratory attendance rate must be obtained.

may include homework, tutorial exercise, project/mini-project, presentation

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Test	Describing basic antenna theory, antenna parameters, and EM radiation	High	Significant	Moderate	Basic	Not even reaching marginal level
2. Assignments	2.1 Describing the basic measurement techniques for antennas 2.2 Describing the essential factors and components in high-frequency measurements	High	Significant	Moderate	Basic	Not even reaching marginal level
3. Lab Exercises/Reports	Ability to conduct antenna performance measurement, including frequency and time domain technologies for radiation measurement and analysis	High	Significant	Moderate	Basic	Not even reaching marginal level
4. Examination	4.1 Ability to describe the principle and critical components of	High	Significant	Moderate	Basic	Not even reaching marginal level

	different antenna measurement setups, including near-field, far-field, frequency, and time domain measurements 4.2 Ability to describe the operating principle of different antennas, including parabolic, metasurface, lens, horn, patch, slot and array					

Applicable to students admitted from Semester A 2022/23 to Summer Term 2024

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B,)	Marginal (B-, C+, C)	Failure (F)
1. Test	Describing basic antenna theory, antenna parameters, and EM radiation	High	Medium	Low	Not even reaching marginal level
2. Assignments	2.1 Describing the basic measurement techniques for antennas 2.2 Describing the essential factors and components in high-frequency measurements	High	Medium	Low	Not even reaching marginal level

3. Lab Exercises/Reports	Ability to conduct antenna performance measurement, including frequency and time domain technologies for radiation measurement and analysis	High	Medium	Low	Not even reaching marginal level
4. Examination	4.1 Ability to describe the principle and critical components of different antenna measurement setups, including near-field, far-field, frequency, and time domain measurements 4.2 Ability to describe the operating principle of different antennas, including parabolic, metasurface, lens, horn, patch, slot and array	High	Medium	Low	Not even reaching marginal level

6. Constructive Alignment with Programme Outcomes

PILO	How the course contribute to the specific PILO(s)
1	The student will acquire an ability to describe current and anticipated trends in applied electromagnetics through lectures, tutorials, assignments, and/or mini-projects.
2	The student will be able to evaluate and analyze new technologies in applied electromagnetics through lectures, tutorials, assignments, and/or mini-projects.
3	The student will be able to apply specialist knowledge in the topics in applied electromagnetics through the lectures, tutorials, assignments, and/or mini-projects.

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

Latest developments on topics including, but not limited to, the following:

- Millimeter-wave and Terahertz Antennas, Circuits and Devices
- Antenna and Radiation Measurement Techniques from Microwave to Terahertz Bands
- High-Frequency Electromagnetic Devices Modeling and Computational Electromagnetics
- Metamaterials and Metasurfaces – Theory and Applications
- Millimeter-wave and Terahertz Detection and Imaging

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

1.	Lecture notes tailored to cover the selected topics in the latest developments in applied electromagnetics
2.	Books assigned for selected special topics

2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

1.	Relevant journal papers for the selected special topics