



Sungkyunkwan University (SKKU) International Summer Semester (ISS) 2019

Electromagnetics

Professor Ian McArthur, The University of Western Australia

SHORT COURSE DESCRIPTION

This course will provide an understanding of the fundamental principles underlying the theory of electromagnetic fields and waves, and the ability to apply this theory to the solution of simple engineering problems. The course will cover: static electric and magnetic fields, Maxwell's equations, induction, the wave equation and electromagnetic waves, electromagnetic energy transfer, active and passive circuit elements, AC circuits, filters, transmission lines.

READING MATERIALS

Recommended reading for the course is:

Sadiku, Matthew: Elements of Electromagnetics, 6th Edition, Oxford University Press.

COURSE REQUIREMENTS AND GRADING

This course assumes knowledge of Freshman Physics and Engineering Mathematics II.

Students undertaking this course will be graded pass/fail, with a pass being a grade of 60 or above out of 100. SKKU regulations require students to attend at least 80% of all classes, and students who fail to meet this requirement will be graded fail. Students found guilty of academic dishonesty will be graded fail.

The final mark for the course will be based on the following assessment modes:

In-class quiz 1: 25%

In-class quiz 2: 25%

Final examination: 50%

COURSE SCHEDULE

– WEEK I –

Thursday (27 June): 9.00 - 9.20 Introduction and overview; 9.30 – 11.45 Lecture and problem class: **Vectors and Vector Calculus**

Friday (28 June): 9.00 – 11.45 Lecture and problem class: **Electrostatics and Gauss's Law**

– WEEK II –

Monday (1 July): 9.00 – 11.45 Lecture and problem class: **Electric Potential and applications of Gauss's Law**

Tuesday (2 July): 9.00 – 11.45 Lecture and problem class: **Dipole fields, Magnetostatics**

Wednesday (3 July): 9.00 – 11.45 Lecture and problem class : **Ampere's Law, Solenoids, Magnetic Forces**

Thursday (4 July) : 9.00 – 11.45 Lecture and problem class: **Vector Potential 11.00 – 11.45: In-class quiz 1**

– WEEK III –

Monday (8 July) : 9.00 – 11.45 Lecture and problem class: **Electrodynamics, Induction**

Tuesday (9 July) : 9.00 – 11.45 Lecture and problem class: **Continuity Equation, Displacement Current**

Wednesday (10 July) : 9.00 – 11.45 Lecture and problem class: **Wave Equation and Electromagnetic Waves**

Thursday (11 July) : 9.00 – 11.45 Lecture and problem class: 9.00 – 10.45 Lecture: : **Capacitors and Energy Density in Electric Field; 11.00 – 11.45: In-class quiz 2**

– WEEK IV –

Monday (15 July) : 9.00 – 11.45 Lecture and problem class: **Inductors and Energy Density in Magnetic Field**

Tuesday (16 July) : 9.00 – 11.45 Lecture and problem class: **Energy Flow and Poynting Vector**

Wednesday (17 July) : 9.00 – 11.45 Lecture and problem class: **AC Circuits Using Complex Analysis, High and Low Pass Filters**

Thursday (18 July) : 9.00 – 11.45 Lecture and problem class: **Transmission Lines**

Friday (19 July) : 9.00 – 9.30: Question forum; **9.45 - 11.45 Final Examination**