King Fahd University of petroleum and minerals
Department of Physics

PHYS 306 Electricity and Magnetism II
Semester (142)

(1) **Catalogue Course Description**
Phys 306 ELECTRICITY AND MAGNETISM II   **(3-0-3)**
Course Description: A continuation of PHYS 305. Topics covered include: magnetic materials ; Maxwell's equations; the special theory of relativity; applications of Maxwell's equations; physics of plasmas; wave guides and resonance cavities; simple radiating systems and diffraction; the Lienard-Wiechert potentials.

Prerequisite: PHYS 305

(2) **Text Book:**
Introduction to Electrodynamics Theory", D. J. Griffiths, (3rd Edition Pearson, 2008)

(3) **Reference Books**
1- "Classical Electricity and Magnetism", W K H Panofsky and M Phillips, (2nd edition, Addison-Wesley, Reading MA 1962)
2- "Electricity and Magnetism" Edward M. Purcell. Berkley Physics Course –Vol. 2. (McGraw-Hill, NY 1963)
3- "Electromagnetic Fields & Waves" by P. Lorrain & D. Corson (2nd Edition, W.H. Freeman, 1970)
4- "The Feynman Lectures on Physics", especially Vol-II (http://www.feynmanlectures.caltech.edu/)
5- "Classical Electrodynamics", J.D. Jackson, (3rd Edition John Wiley & sons, Inc. 1999)
6- "Schaum's outline Series Theory and Problems of Electromagnetic", by J. A. Edminister (McGraw-Hill book company, 1979)

(4) **Evaluation:**

MID TERM EXAM	15%
FINAL EXAM	30%
HOMEWORK	30%
TERM-PAPER	15%
INTERACTION	10%

(5)   **Syllabus:**

Physics 306 Lecture Schedule
Semester (142)

Wk. #	Chapter	TOPICS
1	1-6	Review of phys-305
2	7	Electrodynamics, (*)
3	7	Electrodynamics
4	8	Conservation Laws
5	9	Electromagnetic Waves
6	9	Electromagnetic Waves
7	9	Electromagnetic Waves

Midterm on Wednesday 30?? Jumada-I, 1435H (18th of March) at 7.00 p.m.

8	9	Electromagnetic Waves
		Midterm Vacation
9	10	Potentials and Fields
10	10	Potentials and Fields
11	11	Radiation
12	12	Electrodynamics and Relativity, (**)
13	12	Electrodynamics and Relativity
14	12	Electrodynamics and Relativity
15	12	Electrodynamics and Relativity
		Final Exam (Comprehensive)

Notes:
(*)   Term paper title & abstract are due by Week-2 for Instructor endorsement
(**)   Term paper presentation due at the beginning of Week-12

Please visit me for consultation on term papers.

(6)   **Learning Outcomes:**

	Course learning outcomes
1	Appreciate Maxwell's Equations in a way that connects to electromagnetic waves, gauge transformations, radiation and relativistic electrodynamics
2	Explain the concept of transport of electromagnetic energy and momentum.
3	Understand the ideas behind electromagnetic wave propagation.
4	Figure out the retarded potentials in situation involving time-dependent charge and current distributions.
5	Solve problems related electromagnetic radiation.
6	Know and apply the basic principles of special relativity and the concept of Lorentz transformations and solve related problems.
7	Get acquainted with using computers as a pedagogic tool to comprehend electricity and magnetism.
8	Develop problem-solving skills in the main subjects of the course.

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