King Saud University
College of Science
Physics & Astronomy Department
PHYS 104, General Physics II, Section# 83815, 2nd semester 1446 H

Instructor:
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Class Days/Time:
Sun, Tue and Thu from 8:00 AM – 8:50 AM

Office Hours:
Sun, Tue and Thu from 9:00 AM – 10:00 AM

Classroom:
0140 04 1 A 113

Prerequisites:
PHYS 103

Course Description:
The course has been designed to explain the basic principles of electricity and magnetism. The student realizes, at the beginning, the meaning of the electric charges and their interactions with each other as well as their effect on the surrounding space throughout their electric field. After that, the electric potential, due to the electric field, and the electric stored energy in the capacitors are introduced to connect the topic of electricity with other topics in physics. Furthermore, the concept of the direct current and the electric energy consumption are introduced; accordingly, the student will be able to understand how to calculate the cost of the electricity bill. Therefore, the students connect the concepts with the reality. In the middle part of the course, the magnetic field and its effects on the electric charge are explained. Then, the students know how magnetism is created by electricity, and vice versa. As a result, this gives more understanding of how both electricity and magnetism are tightly related to each other. At the end of the course, the alternating current circuits (AC) are explained as well as the concept of the effective values of the voltage and the current (V_{rms} and I_{rms}), the phase angle (N), and the power factor. Consequently, the students should know the meaning of the alternating circuit impedance and the consumed energy as well as the state of resonance in the AC circuits.

Textbook:
Physics for Scientists and Engineers, 6th Edition (by Raymond A. Serway and John W. Jewett). Chapters 23-33.

Other Readings:
1- Fundamentals of physics, 10th edition (by David Halliday, Robert Resnick and Jearl Walker). Chapters 21-31.
2. http://hyperphysics.phy-astr.gsu.edu/hbase/emcon.html#emcon.

Course Evaluation:

Midterm Exam 1	15%
Midterm Exam 2	15%
Experimental Labs	30%
Final Exam	40%
Total	**100%**

Tentative schedule:

Sections	Contents	Pages	Examples	Problems	Lectures
Chapter 23:	**Electric Fields**	**706-738**			**4**
23.3	Coulomb's Law	711-715	23.01 23.02 23.03	23.04 23.07 23.10	
23.4	The Electric Field	715-719	23.05 23.08	23.14 23.20 23.21	
23.6	Electric Field Lines	723-725	-	-	
23.7	Motion of Charged Particles in a Uniform Electric Field	725-728	23.10 23.11	23.42 23.45 23.46	
Chapter 24:	**Gauss's Law**	**739-761**			**4**
24.1	Electric Flux	740-743	24.02	24.03 24.04	
24.2	Gauss's Law	743-745	24.03	24.09 24.11 24.21	

24.3	Application of Gauss's Law to Various Charge Distributions	746-750	24.04 24.05 24.06 24.07 24.08	24.11 24.21 24.24 24.31 24.35 24.37	
24.4	Conductors in Electrostatic Equilibrium	750-752	-	24.40 24.42	
Chapter 25:	**Electric Potential**	**762-794**			**3**
25.1	Potential Difference and Electric Potential	763-765	-	25.02 25.03	
25.2	Potential Differences in a Uniform Electric Field	765-768	25.01 25.02	25.06	
25.3	Electric Potential and Potential Energy Due to Point Charges	768-771	25.03	25.16 25.17 25.20	
Chapter 26:	**Capacitance and Dielectrics**	**795-830**			**4**
26.1	Definition of Capacitance	796-797	-	26.01	
26.2	Calculating Capacitance	797-802	26.01	26.07 26.09	
26.3	Combinations of Capacitors	802-806	26.04	26.18 26.21	
26.4	Energy Stored in a Charged Capacitor	807-810	-	26.31 26.36	
26.5	Capacitors with Dielectrics	810-814	26.06 26.07	26.47	
Chapter 27:	**Current and Resistance**	**831-857**			**5**
27.1	Electric Current	832-835	27.01	27.01 27.11	
27.2	Resistance	835-840	27.02 27.03	27.12 27.15 27.16 27.22	
27.4	Resistance and Temperature	843-844	27.06	27.32 27.33	
27.6	Electrical Power	845-849	27.07 27.08	27.36 27.49	
Chapter 28:	**Direct Current Circuits**	**858-893**			**5**
28.1	Electromotive Force	859-861	28.01	28.02	

28.2	Resistors in Series and Parallel	862-869	28.04 28.06	28.06 28.08 28.09 28.15	
28.3	Kirchhoff's Rules	869-873	28.08 28.10	28.20 28.21 28.36 28.40	
Chapter 29:	**Magnetic Fields**	**894-925**			**4**
29.1	Magnetic Field and Forces	896-900	29.01	29.07 29.09	
29.2	Magnetic Force Acting on a Current-Carrying Conductor	900-904	-	29.12 29.14	
29.4	Motion of a Charged Particle in a Uniform Magnetic Field	907-910	29.06 29.07	29.30 29.37	
29.5	Applications Involving Charged Particles Moving in a Magnetic Field	910-914	-	29.41	
Chapter 30:	**Sources of the Magnetic Field**	**926-966**			**4**
30.1	The Biot-Savart Law	927-932	-	30.04	
30.2	The Magnetic Force Between Two Parallel Conductors	932-933	-	30.16 30.17	
30.3	Ampere's Law	933-938	30.04	-	
30.4	The Magnetic Field of a Solenoid	938-940	-	30.31	
30.5	Magnetic Flux	940-941	30.08	30.35	
30.6	Gauss's Law in Magnetism	941-942	-	-	
Chapter 31:	**Faraday's Law**	**967-1002**			**2**
31.1	Faraday's Law of Induction	968-973	31.01	-	
31.2	Motional emf	973-977	31.05	31.02 31.05 31.13 31.20	
Chapter 32:	**Inductance**	**1003-1032**			**2**

32.1	Self-Inductance	1004-1006	32.01 32.02	32.06 32.07 32.09 32.16	
32.3	Energy in a Magnetic Field	1011-1013	-	32.29 32.30 32.31 32.37	
Chapter 33:	**Alternating Current Circuits**	**1033-1065**			**6**
33.1	AC Sources	1034-1034	-	-	
33.2	Resistors in an AC Circuit	1034-1038	33.01	33.03	
33.3	Inductors in an AC Circuit	1038-1040	-	33.10	
33.4	Capacitors in an AC Circuit	1041-1043	-	33.17	
33.5	The RLC Series Circuit.	1043-1047	33.05	33.21 33.22 33.26	
33.6	Power in an AC Circuit	1047-1049	33.06	33.32 33.33	
33.7	Resonance in a Series RLC Circuit	1049-1051	33.07	33.37	