

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ
الْعَلِيمُ الْحَكِيمُ



Physics A (B 1031)

Electricity and Magnetism

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Department of Basic Engineering Sciences

جامعة بنها
كلية الهندسة بنها
قسم العلوم الهندسية الأساسية

PHYSICS A (B1031)

Lecture 0

Introduction

By: Prof Dr Tarek Abdolkader

OUTLINE

- **Effective Learning**
- **What is Physics?**
- **History of Electromagnetism**
- **About the course**
 - **Course outline**
 - **Advices**
 - **Assessment policy**

التعلم الفعال Effective Learning

● هدفك أن تكتسب مهارات و ليس مجرد تحصيل معلومات

● قيمتك فيما تستطيع عمله و ليس فيما تستطيع تذكره

● أهمية العلوم الأساسية:

- العلوم الأساسية هي التي تفرق بين المهندس والفنى
- بالعلوم الأساسية يمكنك متابعة التطورات السريعة للتكنولوجيا

كيف تذاكر؟

- يجب أن يكون لديك الدافعية للتعلم (نيات التعلم – أهمية الفيزياء)
- اقرأ الدرس قراءة سريعة وعامة قبل حضور المحاضرة
- احضر وسجل واسأل
- راجع الدرس بعد المحاضرة (فى نفس اليوم) و لا تركز على الحفظ
- ناقش مع زملائك و مع مدرسك
- ضع لنفسك خطة زمنية وافصل ساعات مذاكرة المادة الواحدة على أيام منفصلة
- لا بد أن تذاكر كتابة و تحل المسائل بيدك

What is Physics?

- Physics is the branch of science concerned with the nature and properties of matter and energy and the relation between them.
- Physics and Mathematics are the foundation of all other sciences
- Physics can be divided into five major areas:
 - Classical Mechanics
 - Heat and thermodynamics
 - Electricity and magnetism
 - Light and Optics
 - Modern Physics

Electricity and magnetism

There are many applications which use Electricity and magnetism:



mobiles



Computers



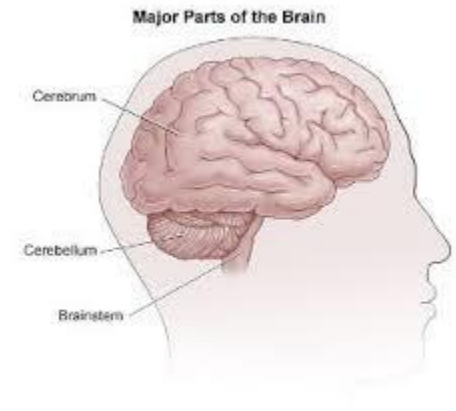
The heart



Motors



Light bulb



The brain

The nature of the course

Course Objective

Upon successful completion of this course, the student should be able to

1. demonstrate knowledge of basic concepts of electricity and magnetism and to apply this knowledge efficiently to solve problems
2. perform Laboratory experiments under controlled guidance and supervision.
3. develop the spirit of cooperation with others and working in a team.

Brief list of topics to be covered:

- | | |
|---------------------------|---------|
| 1. Electric Field | 4 hours |
| 2. Gauss Law | 4 hours |
| 3. The electric potential | 4 hours |
| 4. Capacitance | 4 hours |
| 5. Current and resistance | 2 hours |
| 6. Magnetic field | 4 hours |
| 7. Ampere's Law | 4 hours |
| 8. Faraday's Law | 4 hours |
| 9. Inductance | 2 hours |

Tentative Time Plan

Tentative Time Plan

Week	Date	Lecture1	Lecture2	Lab.	Notes
1	22/9/2019	Ch0: Units and Dimensions	Ch1: Electric Field		
2	29/9/2019	Ch1: Electric Field	Exercises on Ch1	Exp. 1	
3	6/10/2019	Ch2: Gauss' Law	Ch2: Gauss' Law	Exp. 2	Holliday (6/10)
4	13/10/2019	Ch3: Electric Potential	Exercises on Ch2&3	Exp. 3	Quiz #1
5	20/10/2019	Ch3: Electric Potential	Ch4: Capacitance	Exp. 4	
6	27/10/2019	Ch4: Capacitance	Exercises on Ch3&4	Exp. 5	
7	3/11/2019	Revision Ch(1-4)	Ch5: electric current	Lab Exam #1	Midterm Exam
8	10/11/2019	Ch6: Magnetic Field	Exercises on Ch5&6	Exp. 6	

Tentative Time Plan

Week	Date	Lecture1	Lecture2	Lab.	Notes
9	17/11/2019	Ch6: Magnetic Field	Ch7: Ampere's Law	Exp. 7	Holliday (20/11)
10	24/11/2019	Ch7: Ampere's Law	Exercises on Ch6&7	Exp. 8	
11	1/12/2019	Ch8: Faraday's Law	Ch8: Faraday's Law	Exp. 9	Quiz #2
12	8/12/2019	Ch9: Inductance	Exercises on Ch8&9	Exp. 10	
13	15/12/2019	Revision	Exercises (revision)	Lab Exam #2	
14	22/12/2019	Lab Final Exam			
15	29/12/2019				
16	Final Written Exam				

Notes:

1. There are two Quizzes on the theoretical lectures (5 marks each) at weeks 4 and 11
2. There are two Quizzes on the Lab (5 marks each) at weeks 7 and 13
3. The Midterm Exam (20 marks) on the theoretical lectures will be at week 7 or 8
4. The final Lab Exam will start at week 14
5. The final written Exam will start at week 16

The nature of the course

Learning Outcomes:

Upon completion of the course, students will be able to

1. define and calculate electric force and electric field.
2. apply Gauss's law to calculate the electric field due to various charge configurations.
3. define and calculate the electric potential and relate it to the electric field.
4. define and calculate the capacitance of various conductors
5. define and calculate the electric current and electric resistance.
6. define and calculate the magnetic field of moving charges and electric currents
7. Apply Ampere's law to calculate the magnetic field due to various current configurations.
8. Apply Faraday's law to calculate the induced emf in a conductor.
9. Define and calculate the inductance of various inductors.

Resources

Presentation slides: *(not adequate alone)*

Lecture notes

Instructor website: Lecture Notes, Quizzes, and Major Exams, etc. are available on the link: <http://www.bu.edu.eg/staff/tarekhassan015>

Textbook:

Raymond A. **Serway** and John W. Jewett, “Physics for Scientists and Engineers with Modern Physics”, 9th edition, Brooks Cole, 2013.

Additional references:

1. David Halliday, Robert Resnick, and Jearl Walker, “*Fundamentals of Physics*”, 9th edition, Wiley, 2011.
2. Paul A. Tipler and Gene Mosca, “*Physics for Scientists and Engineers*”, sixth Edition, W. H. Freeman, 2008.
3. Douglas C. Giancoli, “*Physics: Principles with Applications*”, 6th edition, Pearson Education, 2004.

List of Lab Experiments:

1. Resistors Combinations
2. Ohm's Law
3. Kirchhoff's Laws
4. Wheatstone bridge & Metric bridge
5. Electric Field Mapping
6. Capacitor Charging
7. Capacitor Discharging
8. The Electric Transformer (I)
9. The Electric Transformer (II)
10. Faraday's Law

Laboratory sessions are conducted once a week for 2 hours.

Advices

Advices to go through easily in this course:

1. Your goal is to acquire skills not to memorize knowledge.
2. Your value is measured with what you can do, not with what you can memorize.
3. The difference between the Engineer and the Technician is the ability to design, synthesize, cope with rapid changes in technology.
4. This course is an important basic course.
5. Attendance of lectures is a must.
6. Ask whenever you feel any ambiguity or confusion.
7. Note the updated information on the website:

<http://www.bu.edu.eg/staff/tarekhassan015>

Grading Policy

Semester works	Lab	Final Exam	Total
30	30	90	150

Semester works 30	Quiz #1 5	The first Quiz is at the 5 th week
	Midterm Exam 20	The first Major Exam is after the 5 th week
	Quiz #2 5	The second Quiz is at the 12 th week
Lab 30	Lab semester works 10	Performing experiments, solving pre-lab questions, and discipline
	Lab quizzes 10	The first quiz is after finishing 5 experiments and the second is after finishing the other 5 experiments
	Final lab exam 10	Final Lab exam is to be held after 13 th week.
Final exam 90		

Absence more than 25% of hours of the course leads to *Denial*.

Online resources

1. <http://hyperphysics.phy-astr.gsu.edu/hbase/hph.html>
2. <http://www.learnerstv.com/lectures.php?course=ltv008&cat=Physics>
3. <http://www.nvcc.edu/home/nvmajew/new/Phy232/lectures.html>
4. <http://hazemsakeek.com/magazine/>