PHY-112 | Principles of Physics-2

Akiful Islam (AZW)
Summer 2024 | Class #0

Department of Mathematics & Natural Sciences

Introduction

Introduction
Assessment Rubric

How will your performance be assessed?

- **05%** $\Longrightarrow$ Attendance
- **15%** $\Longrightarrow$ Averaging 4 Quizzes (15 marks each)
- **15%** $\Longrightarrow$ Averaging 4 Assignments (15 marks each)
- **20%** $\Longrightarrow$ Mid-term examination (20 marks)
- **10%** $\Longrightarrow$ Laboratory experiments (10 marks)
- **35%** $\Longrightarrow$ Final examination (35 marks)

NOTE: There will be No Bonus Assessments! You have one shot at this. Make it count!

Syllabus & Prerequisites

Syllabus
How the course is structured

- Part 1: Electric Fields. (14 classes)

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- Part 4: ElectroMagnetic Fields. (1 class)

Syllabus
How the course is structured

Part 1: Electric Fields (6 classes)

- How is Electric Field Created?
- Electric Charge: Micro and Macroscopic. Properties of Charges
- Electric Charge Distribution: Discrete and Continuous
- Electrostatic Forces
- Coulomb's Law of Electrostatics
- Introduction to $\vec{E}$-Field: Field Lines and Intensity
- Charged Particles in $\vec{E}$-Field: Straight and Parabolic Deflection
- Gauss's Law of Electrostatics
- Electric Flux: Uniform and Non-Uniform
- Applications of Gauss's Law: Line, Plane Charges
- List the 1st Maxwell's Equation

Syllabus
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Part 1: Electric Fields (5 classes)

- Work Done due to Electrostatic Force
- Electric Potential Energy
- Electric Potential Intuition
- Electric Potential Measurements for Charge Distributions: Point, Line, Plane. (Integration Heavy)
- Equipotential Surfaces
- Capacitance and Capacitors: With and without Dielectrics
- Energy Stored in $\vec{E}$-Field

Mid-Term will be up until this.

Syllabus
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Part 1: Electric Fields (3 classes)

- What's the point of an Electric Circuit?
- Electric Current: Microscopic View
- Ohm's Law and Conducting Materials
- Electromotive Force (EMF)
- Power in(out)put from Electric Circuits
- Electric Circuit Elements
- Solving DC Circuits: Kirchoff's Laws
- Transient Series *RC* Circuits: Charging and Discharging of a Capacitor

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Part 2: Magnetic Fields (7 classes)

- How is Magnetic Field Created?
- Biot-Savart Law
- Magnetic Field Intensity Measurements for Current Distributions: Straight Wire, Curved Wire, Wire Loop.
- Magnetic Field of a Current Loop and Electromagnet
- Magnetic Force Caused by $\vec{B}$-Fields on Wires: Single Point Charge, Straight Wire, Wire Loop
- Charged Particles in $\vec{B}$-Field: Circular Deflection, Cyclotron
- Gauss's Law for Magnetostatics: Magnetic Flux
- Ampère's Law and how to use it
- List the 2^{nd} Maxwell's Equation

Syllabus

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Part 3: Uniting Electric & Magnetic Fields (2 or 3 classes)

- ElectroMagnetic Induction: Induced EMF and Induced Current
- Faraday's Law of Induction & Lenz's Law
- Inductance and Inductors
- List the 3rd Maxwell's Equation

Part 4: ElectroMagnetic Fields (1 of 0.5 class)

- Displacement Current and Ampère-Maxwell Law
- List the 4th Maxwell's Equation
- Generate and Propagate the ElectroMagnetic Wave: LIGHT

Final will contain 10-15% of Mid Syllabus.

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  - Torque and Rotational motion

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- The Physics part builds You into a good engineer who applies the principles to practice

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- Respect your time, brain, and willpower

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- Rinse and Repeat

That is it for today!