

## Course Description Document

**Course: Physics**

**Technical Institute for Engineering Management and Digitization**

**Dr. Ali Ghassan Hassan**

**Number of Lectures: 12 (2 hours)**

**Course Code: GPH101**

### Abstract:

The course includes eight chapters spread over twelve lectures, and covers a large variety of physical concepts that are involved in many scientific issues and topics derived from the basic science group and dealt with by scientific disciplines

The physics course aims to cover a wide range of physical concepts and express those concepts with mathematical laws and equations that help to consolidate the physical concept in the students. The course is narrated using illustrations that make it easy for the students to follow and relate information (using colours, punctuation and pictures) with an example for each paragraph and some exercises that the students have to answer.

The course seeks to create a database for the student that helps them understand many engineering topics that they encounters in other courses or in their practical life.

Education is provided through theoretical lectures, practical exercises, and research projects. Assessment includes theoretical exams, research project evaluations, and active participation in group discussions and exercises, with the aim of consolidating the physical concepts that are part of engineering and applied sciences.

### Course Chapters

Chapter Number	Chapter Title	Chapter Contents
1	Basics in Physics	The chapter deals with physical quantities, the measurement systems used, and conversions between these systems. It includes the equation of dimensions, the definition of a vector, and operations on vectors (addition, subtraction, multiplication).
2	Movement and Force	It deals with the study of static and moving objects. The chapter includes the concepts of linear motion and equations of motion. It also includes the definition of force, its types, Newton's laws and their applications.
3	Work and Energy	This chapter deals with the concept of work, its types and power. It studies work as a form of energy, explains the principle of conservation of mechanical energy and includes some conservation energy applications.
4	Thermal physics	This chapter includes a study of the concept of temperature, its measurement systems, and conversions between measurement systems. It includes the thermal equilibrium, Methods of heat transfer as well as a study of thermal expansion .
5	Static Electricity	The chapter presents a brief overview of electric charge, Coulomb's law, electric field, electric potential, electric capacitance, electric capacitor, their conduction methods, laws and some of their applications.
6	Electrical Circuits	Includes direct electric current. The chapter studies electrical resistance and its relationship to temperature and electrical power. It shows the components of electrical circuits and their types. Kirchhoff's laws in electrical circuits and their applications in connecting resistors and generators.
7	Basics in Electronics	Detailed explanation of semiconductors, diodes, transistors, analog and digital integrated circuits.
8	Electromagnetic waves	The class studies the nature of electromagnetic waves The study will be done from the point of view of geometric light on the one hand and from the point of view of physical (wave) light on the other hand, and will demonstrate the Wave Particle Duality nature of light. Light is studied as an electromagnetic wave We will use these concepts to talk in some detail about some light beams that deal with the electromagnetic spectrum on the one hand, and some light beams that are considered sources of this spectrum, such as optical fibres and lasers

## Learning Outcomes

Chapter number	Chapter title	Learning Outcomes
1	Basics in Physics	<ul style="list-style-type: none"> <li>Retrieve the basic information necessary for the student in engineering and applied specializations</li> <li>Identify physical quantities</li> <li>Identify measurement systems.</li> <li>Identify scalar and vector quantities.</li> <li>Master vector operations.</li> </ul>
2	Movement and Force	<ul style="list-style-type: none"> <li>Identify constant speed and variable speed.</li> <li>Identify uniformly variable rectilinear motion and its consequences.</li> <li>Identify Newton's laws.</li> <li>Identify applications of Newton's laws.</li> </ul>
3	Work and Energy	<ul style="list-style-type: none"> <li>Understand the concept of work and power.</li> <li>Link the concept of work and energy</li> <li>Understand the conservation of mechanical energy</li> </ul>
4	Thermal physics	<ul style="list-style-type: none"> <li>Identify temperature measurement systems.</li> <li>Identify the principle of thermal equilibrium.</li> <li>Calculate the thermal expansion of objects.</li> </ul>
5	Static Electricity	<ul style="list-style-type: none"> <li>Identify Coulomb force.</li> <li>Identify static electric field.</li> <li>Deduce the relationship of electric potential.</li> <li>Identify electrical capacitance.</li> <li>Identify electrical capacitors.</li> <li>Identify the methods of connecting capacitors.</li> <li>Deduce the relationship of equivalent capacitance.</li> </ul>
6	Electrical Circuits	<ul style="list-style-type: none"> <li>Identify electric current.</li> <li>Identify electrical resistance.</li> <li>Identify electrical power.</li> <li>Identify electrical management components.</li> <li>Identify circuit methods.</li> <li>Identify the power of the electric motor of the generator.</li> <li>Identify Kirchhoff's laws and their applications.</li> </ul>
7	Basics in Electronics	<ul style="list-style-type: none"> <li>Classify materials according to their conductivity.</li> <li>Explain the concept of energy bands.</li> <li>Identify the structure of pure and hybrid semiconductors.</li> <li>Identify the junction diode.</li> <li>Identify the transistor and its structure.</li> <li>Identify integrated circuits.</li> </ul>



8	Electromagnetic waves	<ul style="list-style-type: none"><li>• Identify the basic principles of reflection.</li><li>• Identify the types of mirrors.</li><li>• Identify the basic principles of refraction.</li><li>• Identify the types of lenses.</li><li>• Explain the concept of total internal reflection.</li><li>• Understand constructive and destructive interference.</li><li>• Understand diffraction.</li><li>• Explain the light as an electromagnetic wave.</li><li>• Identify the uses of electromagnetic wave.</li></ul>
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### Assessment Methods

- Discussing the physical concepts included in the course.
- Solving the exercises included in each chapter.
- Submit a worksheet (during the semester) as suggested by the teacher, including one of the following topics:
  - ✓ Research on one of the topics included in the course.
  - ✓ Answer questions suggested by the teacher on the topics included in the chapter.

### ➤ References:

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