



**Al-Mustaqbal University College**  
**Radiological Techniques Department**



# **Radiation Physics**

**2<sup>nd</sup>**

## **Lecture1: Radiation &EM spectrum**

**By**

**Prof.Dr.Raad Shaker Alnayli**

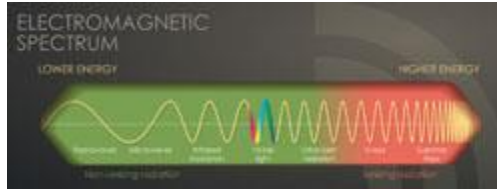
**MS.c.Reem Taumu Yousif**

**2022/2023**

# What is *Radiation*?

Radiation is energy that comes from a source and travels through space at the speed of light  $3 \times 10^8$  m/sec. This energy has an electric field and a magnetic field associated with it, and has wave-like properties. You could also call radiation “electromagnetic waves”.

## The Electromagnetic Spectrum



- There is a wide range of electromagnetic radiation in nature. Visible light is one example.
- Radiation with the highest energy includes forms like ultraviolet radiation, x-rays, and gamma rays.
- X-rays and gamma rays have a lot of energy. When they interact with atoms, they can remove electrons and cause the atom to become ionized.

## The Ionized Atom



- Radioactive atoms have unstable blends of protons and neutrons.
- Radioactivity is the spontaneous release of energy from an unstable atom to get to a more stable state.
- Ionizing Radiation is the energy that comes out of a radioactive atom.
- Radioactive isotopes are radioactive atoms of the same element that have different numbers of neutrons.
-

## Properties of Radioactive Isotopes



- Radioactive atoms can give off four types of ionizing radiation: alpha particles, beta particles, gamma rays, and neutrons.
- Each type of radiation has different properties. Their properties affect how we can detect it and how it can affect us.
- An unstable atom changes into a more stable atom of a different element by giving off radiation. This process is called radioactive decay.
- A half-life is the length of time it takes for half of the radioactive atoms in a group of radioactive isotopes to decay.