

Specialization	Radiologic Technology
Course Number	020810101
Course Title	medical Physics
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Brief Course Description:

- The course provides a general introduction to the physics of biological systems.
- The course introduces the fundamental concepts of living systems, cell structure and functions, concept of replication, DNA and protein structure, Brownian motion and diffusion, electrophoresis, descriptive models of liquids flow, electrophoresis and osmosis.

Course Objectives:

Upon the completion of the course, the student will be able to:

1. Deal with e&m components and problems such charge, field, volts, currents, etc.
2. Read diagrams and connect circuits and get results.
3. It is desired to identify the physical laws and its rule on biological phenomena and life.
4. Solved problems will cover the applications of physics in biological systems.

Unit Number	Unit Name	Unit Content	Time Needed
1	Introduction	<ul style="list-style-type: none"> • Introduction to biological structures. 	
2		<ul style="list-style-type: none"> • Structure and formation of biomolecules. • Structure of membrane molecules. 	
3	Thermodynamic	<ul style="list-style-type: none"> • Definition • Fundamental concepts of thermodynamic. • temperature, kinetic theory and ideal gas law • Thermal regulation within the body 	
4	Cell	<ul style="list-style-type: none"> • Cell structure and function. • Electrostatic field and cells. • Self-assembly and stability. • Neuron composition • The concept of response within neuron 	
5	DNA	<ul style="list-style-type: none"> • DNA and its functions. • Proteins and Protein folding. 	
6	Brownian motion	<ul style="list-style-type: none"> • Brownian motion definition and explanation. • Examples of Brownian motion. • Importance of Brownian motion. • Brownian motion and motility. 	
7	Fluids	<ul style="list-style-type: none"> • Basic properties of fluid. • Viscosity of biological fluids. • Biomechanics of fluid behavior. • Fluid pressure and flow in blood circulation 	
8	Electrophoresis	<ul style="list-style-type: none"> • Principles • Factors affecting: <ul style="list-style-type: none"> ○ Inherent factors ○ External environment • Conventional electrophoresis • General operation: <ul style="list-style-type: none"> ○ Separation ○ Detection ○ Quantification • Technical and practical consideration • Types of electrophoresis: <ul style="list-style-type: none"> ○ Zone electrophoresis ○ Moving boundary electrophoresis 	
9	Osmosis and Osmotic Pressure	<ul style="list-style-type: none"> • Definition • Equation • Examples from human body • Applications (artificial kidney) • Effect of dehydration and over hydration 	

Teaching Methodology:

1. Lectures.
2. Discussion & Quizzes.
3. Home works

Text book:

Biophysics: An Introduction, by Cotterill, John Wiley and Sons (2003).

Supplementary references

1. Comprehensive Biomedical Physics, byNewnes 2014
2. Biophysics, by W. Hoppe, W. Lohmann, H. Markl, H. Ziegler 2012
3. Biology in Physics: Is Life Matter, by K. Bogdanov, Academic Press (2004).
4. Biophysics, by R. Glasser, Springer Verlag (2001).
5. Medical physics, by Martin Hollins,Nelson Thornes, 2001
6. Introduction to Molecular Biophysics, by J. Tuszynski, CRC Press (2003).

