



King Saud University
College of Applied Medical Sciences
Department of Biomedical Technology

BMT224 Applied Physics for Biomedical Technology 4 (3-1-0)

Current Instructor: Mohammad Nisar
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Textbook(s) and/or Other Required Materials:

Primary: Paul E. Tippens, " Physics", 7th Edition, McGraw-Hill, 2005.

- Jack A. Tuszynski, John M. Dixon, "Biomedical Applications of Introductory Physics", John Wiley & Sons, Inc., 2002

Course Description (catalog):

In this course basic topics like dimensional analysis, multiplication of vectors, gradient, divergence, and curl of a vector, Maxwell equations, applications of Newton's laws of motion, translational and rotational equilibrium, work, energy, and power, thermodynamics, fluid, sound and radiation physics, atomic and nuclear physics are covered. The applications of these principles in bio-medical phenomena are also discussed.

Prerequisites: PHY-106

Co-requisite: None

Course Type: Mandatory

Course Learning Outcomes:

Upon completing BMT224, students should have the following capabilities:

1. Understanding of Units and dimensions, Vectors and scalars, multiplication of vectors, applications of Newton's laws of motion.
2. Students have Knowledge of translational and rotational equilibrium, work, energy, and power.
3. Understanding of Pressure, Measuring pressure, Temperature, Measurement of temperature.
4. Basics of atomic physics, spectroscopy, nuclear physics and their uses in medical fields.
5. Knowledge of ultrasound, ionizing radiation, and their applications in medical.

Student Outcomes Covered by Course:

a- an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities;

The ability to understand basics of physics and how it relates to bio-medical phenomena, knowledge of ultrasound, nuclear and atomic physics, ionizing radiation, and their applications in medical fields.

b- an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;

The ability of understandings basics of units and dimensions of different physiological parameters, Vectors and scalars, multiplication of vectors, Gradient, divergence, and curl of a

vector, Maxwell equations, electrostatics, Solution of equilibrium problems translational and rotational equilibrium work and energy to solve the problems and their applications.

c- an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes;

The ability to perform basic experiments analyze the data interpret the outcome of experiment and performs error analysis and statistics.

Major Topics covered and schedule in weeks:

1. Units and dimensions of different physiological parameters, Vectors and scalars, multiplication of vectors.
2. Gradient, divergence, and curl of a vector, Maxwell equations, electrostatics.
3. Translational equilibrium, Free-body diagram, Solution of equilibrium problems.
4. Torque and rotational equilibrium, Conditions for equilibrium, Torque, Centre of gravity.
5. Work, energy, and power.
6. Nuclear physics and the nucleus: atomic mass unit, Isotopes, The mass defect and binding energy, Radio-activity, Half-life, Nuclear fission, Nuclear fusion.
7. Atomic physics: Hydrogen atom, spectroscopy
8. Sound: Production of sound waves, Speed of sound, Resonance, Interference and beats, Doppler effect, Ultrasound: applications in medical.
9. Temperature and expansion: Measurement of temperature, Linear, area, and volume expansion, The abnormal expansion of water.
10. Fluids at rest, Density, Pressure, Fluid pressure, Examples of pressure in human organs, Measuring pressure, Archimedes' principle.
11. Nature and properties of ionizing radiation, their used in medicine and their interaction with matter.