

Global Learning Semesters

Course Syllabus

Course: BIOL-240 Elements of Biophysics

Department: Health and Life Sciences

Host Institution: University of Nicosia, Nicosia, Cyprus



Course Summary		
Course Code	Course Title	Recommended Credit Hours
BIOL-240	Elements of Biophysics	3
Semester Offered	Contact Hours	Prerequisites
Please contact us	42-45	BIOL-105, BIOL-106, BIOL-110
Department	Level of Course	Language of Instruction
Health and Life Sciences	Lower Division	English

Course Description

The course aims to provide students with a basic understanding of physics in relation to the human body and in relation to technologies equipment used in clinical applications. The student will learn about the biophysical bases of ultrasound and non-ionizing electromagnetic radiation, ionizing radiation and safety standards, and the key factors on the effects of radiation on cells and tissues and in radiation protection. The student will also be introduced to the use of isotopes for radiology, nuclear medicine and radiation therapy; sterilization of medical material and equipment. Radiation therapy health and safety requirements of regulatory bodies and the responsibilities of the radiation team members will also be explored. The student will also gain knowledge on the latest applications such as nuclear imaging techniques, CT scanners, ultrasound techniques, laser surgery and biomaterial used in medicine. The course format will be two hours lecturing and one hour tutorials per week on medical technologies and applications such as ultrasound imaging, x-ray and nuclear medicine imaging, computed tomography (CT) scans, radiation therapy and magnetic resonance imaging (MRI), lasers in general surgery in ophthalmic, ENT (Ear, Nose, & Throat surgery), dermatology, cardiac, in colorectal surgery, gynaecology and in cancer therapy, pace makers, artificial hearts etc.

Prerequisites

BIOL-105, BIOL-106, BIOL-110

Topic Areas

1. Biomechanics, Description of Motion; Causes of Motion
2. Fluid mechanics; Properties of Gases;
3. Internal Energy, Heat and Temperature;
4. Introduction to Electricity and Magnetism; Bioelectricity;
5. Electrical Safety in the Hospital
6. Medical Applications of Pressures in Fluids;
7. Pressure and the Circulatory System; safety critical system and engineering devices
8. Physics of Hearing and Vision; ultrasound in medical diagnosis
9. Light and Modern Physics; lasers and non-ionizing electromagnetic radiation
10. Nuclear Radiation; Units, decay, alpha, beta and gamma particles, x-rays
11. Biological Effects of Radiation and risk evaluation from radiation exposure
12. Nuclear Medicine; Safe handling, rules and regulations
13. External/Internal Radiation, Protection Guide
14. Biomaterials and applications in Medicine

Readings and Resources

Required Textbooks

1. Physics for the Health Sciences by Carl Nave, Brenda Nave Publisher: W.B. Saunders Company; 3rd edition (February 1, 1985) ISBN: 0721613098
2. Introduction to Physics in Modern Medicine by Suzanne Amador Kane Publisher: CRC Press; 1 edition (December 23, 2002) ISBN: 0415301718

Recommended Reading

1. Introduction to Health Physics by Herman Cember Publisher: McGraw-Hill Professional; 3 edition (January 1, 1996) ISBN: 0071054618
2. Physics in Biology and Medicine (Complementary Science Series) by Paul Davidovits Publisher: Academic Press; 2 edition (January 15, 2001) ISBN: 0122048407
3. Walter & Miller's Textbook of Radiotherapy Radiation Physics, Therapy and Oncology, C.K. Bomford, BSc and et. al. , 2003, Publisher: Advanced Medical Publishing ISBN: 0443062013
4. Nuclear Medicine Physics, 6th ed. By Ramesh Chandra, Ph.D Lippincott Williams & Wilkins, published May 2004; ISBN:0781747538
5. Handbook of Health Physics and Radiological Health by Bernard Shleien, Lester A., Jr. Slaback, Brian Birky, Bernard Shleien Publisher: Lippincott Williams & Wilkins; 3rd edition (September 1, 1997) ISBN: 0683183346
6. Physics for Radiation Protection by James E. Martin Publisher: Wiley-Interscience; 1 edition (May 12, 2000) ISBN: 0471353736
7. Biomaterials Science : An Introduction to Materials in Medicine by B. D. Ratener, A. S. Hoffman, F. J. Schoen, J.E. Lemons Publisher: Academic Press; 2 edition (July 29, 2004) ISBN: 0125824637