

MSc. Bio-Medical Physics

6- Bio and Medical Physics

Program Schedule:

First Semester (all tracks)

Specialty	Course Code	Course title	Credit hours
All	PHYS 500	Research Methodology	1 (1+0)
All	PHYS 501	Mathematical Physics	2 (2+0)
All	PHYS 505	Advanced Quantum Mechanics	3 (3+0)
All	PHYS 508	Classical Mechanics	3 (3+0)
	Total		9 (9+0)

Second Semester

Course Code	Course title	Credit hours
PHYS 504	Statistical Physics	3 (3+0)
PHYS 507	Classical Electrodynamics	3 (3+0)
PHYS 591	Principles of Biophysics	3 (3+0)
Total		9 (9+0)

Third Semester

Course Code	Course title	Credit hours
PHYS 592	Biomedical Physics Lab.	2 (0+2)
PHYS 593	Introduction to Medical Physics*	2 (2+0)
PHYS 594	Nuclear Medicine*	2 (2+0)
PHYS 595	Biophysics of cell communication *	2 (2+0)
PHYS 596	Special Topics in Biophysics*	2 (2+0)

***The student chooses Phys 592 + 2 other courses (6 credits)**

PHYS 591 Principles of Biophysics **3(3+0)**

Biological cell and membrane structures. Membrane permeability. Permeability barrier. Active transport. Nernst Potential. Different models of membrane system. Liposomes and its applications. Functional organization of the human body and the control of internal environment. Hemostasis. Blood composition and coagulation; rheology of blood. Structure of heart & heart muscles. The electrocardiogram (ECG). The regulation of circulation. Hemodynamics of blood (blood flow and pressure). Macro-circulation and microcirculation. physiological biophysics techniques.

PHYS 592 Biomedical Physics Lab. **2(0+2)**

Spectroscopy - Models membrane preparation and measurements –AC & DC Dielectric relaxation of biological molecules- Viscosity and Dynamics of Biological Fluids – Radiation Dosimeters. Radiation diagnosis and treatments (Hospital training).

PHYS 593 Introduction to Medical Physics **2(2+0)**

Ultrasound waves and its production. The interaction of ultrasound with tissues, Ultrasonic scanning methods: A-scan and B-scan method, Doppler Effect. X-rays and their Production, X-ray spectra. Attenuation of X-rays. The radiographic Image. Diagnostic applications of X-rays. Advantages and Disadvantages of X-rays. Magnetic resonance imaging: Nuclear Magnetic resonance, Localization of the signal. Factors influencing of signal intensity, Instrumentation and equipment.

PHYS 594 Nuclear Medicine **2(2+0)**

Nuclear radiation, Interaction of radiation with biological materials. Production of artificial radionuclide's, Radio- pharmaceuticals, Radionuclide imaging, radioisotopes diagnostic.

PHYS 595 Biophysics of Cell Communication **2(2+0)**

Overview of cell signaling; Communication and distance; Receptor locations; Cell Membrane surface receptor classes; Signal Transduction Pathways; Signals Amplification; Specificity of cell signaling; Cellular response; .

PHYS 596 Special Topics in Biophysics **2(2+0)**

This course will be given and selected by the supervisor/staff member to help the student to achieve his thesis.