University of Kerala

Discipline	**PHYSICS**				
Course Code	**UK2MDCPHY104**				
Course Title	**MEDICAL PHYSICS**				
Type of Course	**MDC**				
Semester	**II**				
Academic Level	**100 - 199**				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	3	3 Hrs	-	-	3 Hrs
Pre-requisites	-				
Course Summary	The course deals with the physical phenomenon revolving around the biological systems				

BOOKS FOR STUDY:

1. Biophysics, Vasantha Pattabhi N Goutham, Kluwer Academic Publishers, Newyork, Boston
2. 'HEAT TRANSFER APPLICATIONS IN BIOLOGICAL SYSTEMS', Liang Zhu University of Maryland Baltimore County, Baltimore, Maryland
3. "The Physics of radiation Therapy" by Faiz M Khan, Edn 3, Lippincott Williams and Wilkins.
4. Essentials of Biophysics: P. Narayanan, 2nd Edn. New Age publishers

BOOKS FOR REFERENCE:

1. A text book of biophysics: R. N. Roy, New central book agency Kolkata.
2. Introduction to Biophysics, Pranab Kumar Banerjee, S. Chand&co, NewDelhi
3. Elementary bio physics, P. K. Srivastava, Narosa publishing house, NewDelhi

DETAILED SYLLABUS: THEORY

Module	Unit	Content	Hrs	CO No
I		**Origin and Evolution of Life (Book 1 Chapter 1 & Chapter 14)**	**9**	
	1	Prebiotic Earth	1	1
	2	Theories of Origin and Evolution of Life	2	1
	3	Cell Components – Proteins -Nucleic Acids	2	1
	4	Atoms and Ions, Molecules Essential for Life	2	1
	5	Heat Transfer in Biomaterials: Heat Transfer Mechanism, The Heat Equation, Joule Heating of Tissue	2	2
II		**Energy pathways in Biology (Book 1 Chapter 3 & Chapter 11)**	**9**	
	6	Free Energy, Coupled Reactions, Group Transfer Potential, Photosynthesis Photosystem, Photophosphorylation and Carbon Fixation	3	2
	7	Oxidation, Glycolysis, The Krebs Cycle, The Respiratory Chain, Diffusion, Osmosis, Osmotic Pressure, Osmoregulation	2	2
	8	Surface Tension, Dialysis, Adsorption, Viscosity	2	1
	9	Thermal Conduction, Colloids, Sedimentation.	2	1
III		**Biomechanics (Book 1 Chapter 12)**	**5**	
	10	Striated Muscles, Contractile Proteins, Mechanical Properties of Muscles, Contraction mechanism, Role of Ca 2+ions	2	1
	11	Bio Mechanics of Cardio Vascular System Blood Pressure	1	1
	12	Electrical Activity During the Heart Beat-Electro Cardiography	2	1
IV		**Physics of Radiotherapy (Book 3 Chapter 2, 3,4)**	**13**	
	13	Overview of Modern Radiotherapy Techniques, Need and Necessity of Quality Assurance Programme in Radiotherapy.	3	2
	14	Physical Principles of X-Ray Diagnosis - Interactions of X-Rays with Human Body, Differential Transmission of X-Ray Beam	4	3
	15	Beam Therapy and Brachytherapy	2	3

	16	Overview of Digital Subtraction Radiography and Mammography	2	3
V*	**Absorption and Fluorescence Spectroscopy (Book 3 Chapter 5, 6, 7)**		**9**	
	17	Electromagnetic Spectrum, Properties of Electromagnetic Radiations	1	4
	18	Concept and Types of Spectroscopies	1	4
	19	Absorption Spectrum, Energy Characteristics of Spectrum	1	4
	20	Fundamental Laws of Photometry: Beer's Law	2	4
	21	Principles of fluorescence, Colorimeter, Spectrophotometer & Spectro Fluorophotometer	2	4
	22	Ultrasound, CT, MRI Scanners (Basic Ideas Only)	2	4

COURSE OUTCOMES

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
CO-1	Interpret the fundamentals of physics adds values on biological systems	R, U	PSO-1,2, 3
CO-2	Explain models of biological system dealing with transport phenomena.	R, U	PSO-1,2
CO-3	Administer experimental techniques for making correct and appropriate use of a range of scientific equipment used in biological systems	R, U, Ap	PSO-1,2,3
CO-4	Analyse the biologic system by making use of experimental techniques in physics	R, U, An	PSO-3,6,

R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create

Name of the Course: MEDICAL PHYSICS

Credits: 3:0:0 (Lecture: Tutorial: Practical)

CO No.	CO	PO / PSO	Cognitive Level	Knowledge Category	Lecture (L)/ Tutorial (T)	Practical (P)
CO-1	Understand and interpret the fundamentals of	PO-1,2 PSO-1	U	F, C	L	-

	physics adds values on biological systems					
CO-2	Explain models of biological system dealing with transport phenomena.	PO-1,2 PSO-1	U	P	L	-
CO-3	Study experimental techniques for making correct and appropriate use of a range of scientific equipment used in biological systems	PO-1,3 PSO-1, 2	U, R	C, P	L, T	-
CO-4	Evaluate the biologic system by making use of experimental techniques in physics	PO-2,3 PSO-1, 3	U, R	F, C, P	L, T	-

F-Factual, C- Conceptual, P-Procedural, M-Metacognitive

Mapping of COs with PSOs and POs :

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO-1	1	-	-	-	-	-	-	2	2	--	-	-	-	-	-
CO-2	1	-	-	-	-	-	-	2	2	-	-	-	-	-	-
CO-3	1	1	-	-	-	-	-	2	-	2	-	-	-	-	-
CO-4	1	-	2	-	-	-	-	-	2	2	-	-	-	-	-

Correlation Levels:

Level	-	1	2	3
Correlation	Nil	Slightly / Low	Moderate / Medium	Substantial / High

Assessment Rubrics:

- Quiz / Assignment/ Discussion / Seminar
- Midterm Exam
- Programming Assignments
- Final Exam

Mapping of COs to Assessment Rubrics :

CO No	Internal Exam	Assignment	Project Evaluation	End Semester Examinations
CO-1	✓	-	-	✓
CO-2	✓	-	-	✓
CO-3	✓	✓	-	✓
CO-4	✓	✓	-	-