CODE : **BIOHUM0 1**	COURSE TITLE: **BIOPHYSICS**	ECTS: **6**
COORDINATOR: **KRZYSZTOF POLEWSKI**	DEPARTMENT: **PHYSICS**	

Course Category **BIOPHYSICS**

VOLUME (H) **60**			PERSONAL WORK (H)	
LECTURE: (H) **30**	PRACTICALS / LAB (H) **30**	PLACEMENT(H)	PROJECT: (H)	OTHER MODALITIES: (H)

EVALUATION:	OTHER MODALITIES:	LECTURER(S)

EVALUATION MODALITIES			
ORAL INDIVIDUAL REPORT			**KRZYSZTOF POLEWSKI**
WRITTEN INDIVIDUAL REPORT			
FINAL ORAL EXAM			
FINAL WRITTEN EXAM	**X**		

COMMENTS OF EVALUATION:	TEACHING METHODS: **LECTURES AND LABS**
SEMESTER: **WINTER / SUMMER**	LANGUAGE**: ENGLISH**
PERIOD:	YEAR OF STUDY: **SECOND/THIRD**

OBJECTIVES

to familiarize students with physical phenomena and laws regarding to living matter

CONTENTS

Physical phenomena, laws and units. Foundations of biophysics Fundamental forces and interactions in nature. Elementary particles and interactions. **Electromagnetic interactions.** Ionic, covalent, hydrogen, nonbonding, hydrophobic. Peptide bond, Ramachandran plot.**Thermodynamics in closed and open systems.** The first law and the second law of thermodynamics, phase transitions, entropy, free energy and free enthalpy. Theromodynamics of solutions. Thermodynamics of hydrophobic interactions. Thermodynamics of active transport. Biophysics of complex systems: elements of nonequilibrium thermodynamics in biology, homeostasis, stationary states, Prigogines rule, Onsager coefficients. Statistical thermodynamics. Stochastic processes in biology. **Molecular basics of biological phenomena** Diffusion, osmosis, surface tension, viscosity. Energy flow in biomolecular systems. **Spectroscopic methods.** Spectroscopic analysis of proteins and nucleic acids. Spectroscopic methods of determination of secondary structures. Circular dichroism. Methods for automatic analysis of data. Infrared spectroscopy. Application for analysis of macromolecular structures. Fluorescence. Application of fluorescence for structural analysis of biopolymers. **Biophysics of membranes** Biophysics of lipids, liquid crystal structure, phase transition, monolayers, liposomes. Biological membranes, structure and function, integral and peripheral membrane proteins. Transport across the membrane, diffusion, natural and induced permeability. **Biophysics of biological structures.** Dynamic properties of macromolecules. Transitions of electrons in biopolymers. Background, molecular organization and dynamics of biological membranes. Sedimentation, physical basis and application in fractionation of biological materials. Basics of quantum mechanics. Information content in DNA. **Water.** Specific properties of water as biological solvent.

GROUP SIZE: **15**	PRE-REQUISES: