FACULTY OF PHYSICS

COURSE	PROFESSOR	SEMESTER	LANGUAGE/LEVEL	ECTS CREDITS	STUDY LEVEL	COURSE DESCRIPTION
Introduction to polymer physics	Assoc. Prof. Maria Marudova	w, s	BG, EN(B1)	5	Bachelor, Master	The course presents the basic concepts in polymer chemistry and physics, polymer classification, nomenclature and more important properties. The physical states of the polymers, their main phase and kinetic transitions, which determine their unique visco-elastic behavior, are explained in detail. Case studies include relationships between structure, properties and function in technologically important polymeric systems.
Polymers in food science	Assoc. Prof. Maria Marudova	w, s	BG, EN(B1)	5	Bachelor, Master	The course is structured into two parts. The first part gives basic knowledge about the hydrocolloid structure and properties. Some of their most typical applications in the food industry are presented. The role of hydrocolloids as stabilizers, thickeners and crosslinking agents is discussed. The possibilities for immobilization and encapsulation of biologically active components, the construction of multilayer structures based on electrostatic self-assembly and their use as "intelligent" packaging are explained. In the second part of the course, some special representatives of the hydrocolloids are considered. Particular attention is focused on the natural polymers - polysaccharides and proteins, as well as to certain classes of synthetic polymers that, due to their biodegradability and biocompatibility, are permitted by the European Union regulations for food industry applications.

Food rheology and texture	Assoc. Prof. Maria Marudova	w, s	BG, EN(B1)	5	Bachelor, Master	The course is structured in three parts. The first part is focused on the basic rheological parameters and laws, introducing the model ideas in the study of the rheological properties and the basic methods for determination the respective rheological parameters. In the second part, the relation between the rheology and the texture of the food products is emphasized, and in the third part, some important classes of food products and their specific rheological characteristics are discussed.
Introduction to physics of the Earth	Gospodinov	S	BG, EN/B1		Bachelor, Master	The course will familiarize the students with the basics of geophysics, including: Origin and structure of the earth ; Magnetic field of the Earth; Earth gravity field; Tectonic plates theory; Seismic activity and seismic hazard mitigation; Basic approaches to geophysical exploration; Minerals and rocks structure. At the end of the course students will be acquainted with the basic geophysical fields of the Earth and the interaction among pincipal geophysical quantities. They will be able to understand and perform basic analysis of some geophysical data - taken from direct measuring or from the Internet.
General Physics 1	Assoc. Prof. Todorka Dimitrova	W	BG, EN,IT, RU	9	Bachelor	This course presents the basics of Mechanics, Molecular Physics, Thermodynamics and Relativity Theory. Lectures are accompanied by demonstration experiments. Laboratory exercises and seminars on solving physical problems are also included.

General Physics 2	Assoc. Prof. Todorka Dimitrova	S	BG, EN,IT, RU	9	Bachelor	The course consists of two parts. The first one treats Electricity and Magnetism. It addresses electrostatics, electrical currents, permanent magnetic fields and electromagnetic phenomena, Maxwell equations and electromagnetic waves. The second part is dedicated to Optics. It gives basic knowledge about theories on the nature of light, photometry, geometrical optics, wave optics, interference, diffraction and polarization. Lectures are accompanied by demonstration experiments. Laboratory exercises and seminars on solving physical problems are also included.
Optics	Assoc. Prof. Todorka Dimitrova	S	BG, EN,IT, RU	9	Bachelor	The course aims at familiarizing the students with the nature and properties of light including its interaction with matter. An overview on light theories will be presented. Photometric quantities, units and measurements are introduced. The main part of the course deals with interference and diffraction phenomena and the devices based on them as well as some practical applications. Polarization phenomena are a particular topic of the course. They comprise birefringence, polarizers, electro-optical and magneto-optical effects and polarization rotation. The border between wave optics and geometrical optics is discussed, including optical devices. Lectures are accompanied by spectacular demonstration experiments. Laboratory exercises and seminars on solving physical problems are also included.

Photometry and colorimetry	Assoc. Prof. Todorka Dimitrova	W /S	EN, IT, RU		Bachelor, Master	Photometry considers light as a flux of energy. The course gives a short historical introduction and familiarizes the students with the main photometric and radiometric quantities and units. The photometric properties of different materials are described. The human eye is presented as a geometrical optical device that acts as well as a photodetector. Light emission mechanisms (black body and real body radiation as well different kinds of luminescence) are explained. Various artificial light sources and the main photometric etalons are presented. Part of the course is dedicated to photodetectors. The principles of Visual Photometry are introduced and the most commonly used photometric devices and measuring methods are presented. Students are further introduced to the basics of colorimetry and colorimetric measurements. The course is accompanied by demonstration experiments.

Basics of Interferometry	Assoc. Prof. Todorka Dimitrova	W/S	BG, EN,IT, RU		Bachelor, Master	Interferometers are optical devices relying on the coherent superposition of waves for very precise measurements, such as the online control of the index of refraction, the measurement of small displacements, the wavelength of light, surface irregularity, etc. Interferometry finds many applications in optics, fiber optics, astronomy, spectroscopy, holography, metrology, gravitational wave detection and many other areas of science and industry. The course introduces interference theory and presents a large variety of interferometers, giving details on their construction, measurement principles and applications. The course includes a series of laboratory exercises. It is accompanied by unique demonstration experiments illustrating the wave-particle duality of light and the phenomenon of quantum erasing.
Biophysics	Assoc. Prof. Todorka Dimitrova	S	BG, EN,IT, RU	8	Bachelor, Master	The course is dedicated to students in Medical Physics, Medical Chemistry and Medical Biology. It presents a physical approach to living systems. The lectures deliver basic knowledge in biothermodynamics, transport through membrane, electrical properties of biological cells and tissues, the origin and function of biopotentials, biomechanics, radiobiology and sense perception. Specific physical methods and techniques used in biophysics are included. Lectures are accompanied by laboratory exercises.

Introduction to Medical Physics	Assoc. Prof. Todorka Dimitrova	W/S	EN, IT, RU	7	Bachelor, Master	The course is dedicated to Bachelor students in Medical Physics. It introduces the participants to the curricula of professional Medical Physicists. The course gives an overview of Medical Physics in general. Physics offers to medicine powerful theories, experimental methods and technical tools for investigating the human body at any structural level. One distinguishes Radiation and Clinical Medical Physics. The first one includes Medical Imaging, Nuclear Medicine, Radiotherapy, Dosimetry, Quality Assurance and Radiation protection. The second one is related to non-radiation based physical methods applied in Medicine. Students will get familiar with the main methods, techniques and devices used in Medical Physics.

Impact of Non-ionizing Physical Factors on the Human Body	Assoc. Prof. Todorka Dimitrova	W	BG, EN,IT, RU	7	Bachelor, Masteer	The course is dedicated to students in Medical Physics, Medical Chemistry and Medical Biology. Non-ionizing factors influencing the human body have different origin. They may be artificial, human produced or specifically designed for medical purposes. They all have in common some influence on the human body at different physiological levels. The course introduces various non-ionizing factors, such as heat, humidity, gravity, sound (including infrasound, ultrasound and noise). It addresses the impact on the human body of light, electrical currents, electric and magnetic fields and electromagnetic waves. The respective legislation concerning harmful parameters of different non-ionizing features on human health is presented. Some aspects of cosmic medicine and medical applications are discussed.

Biomedical sensors	Assoc. Prof. Todorka Dimitrova	W /S	BG, EN,IT, RU	7	Bachelor, Mater	The course is dedicated to students in Medical Physics and Biomedical Engineering. It intends to give to the students information about the classification of biomedical sensors, their technical characteristics and applications. Students will get familiar with the physical principles used in different sensor elements including active elements (piezoelectric, electrodynamic, thermoelectric, photoelectric, etc.) and passive elements (resistive, rheostatic, Hall effect, magnetoresistive, photosensitive, thermo-sensitive, semiconductive, inductive, capacitive etc.). Special attention is given to the specific sensors used in medicine for medical diagnostics and monitoring. In particular, we include contact and contactless sensors, heat flux sensors, humidity sensors, sensors for physiological and blood pressure, blood flow sensors, motion sensors, optical and chemical sensors.