SOUTH-WEST UNIVERSITY „NEOFIT RILSKI“
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INFORMATION PACKAGE

/ECTS/

FIELD OF HIGHER EDUCATION: **4. NATURAL SCIENCES, MATHEMATICS AND INFORMATICS**

PROFESSIONAL FIELD: **4.1 PHYSICS SCIENCES**

SPECIALITY**: MEDICAL PHYSICS**

QUALIFICATION CHARACTERIZATION

OF SPECIALTY **“MEDICAL PHYSICS”**

EDUCATIONAL AND QUALIFICATION DEGREE: **BACHELOR OF SCIENCE**

PROFESSIONAL QUALIFICATION: **PHYSICIST, MEDICAL PHYSICS**

PERIOD OF STUDY: **4 YEARS (8 SEMESTERS)**

FORM OF TRAINING: **REGULAR**

The bachelor program of “Medical Physics” has duration of 4 years and is designed to prepare professionals of Professional Division “Natural sciences” with qualification name “Physicist, Medical Physics”. The main goal of training in the specialty is the preparation of well-informed, practically trained, competent and competitive specialists who are able to apply the acquired knowledge and skills in physics in research and applied activities, as well as to work in cooperation with the medical staff in hospitals, laboratories, universities and/or research centers.

The curriculum of the “Bachelor” degree is designed in accordance with the requirements for specialty agreed with European standards for the level of training. The curriculum contains courses divided into three categories - compulsory, elective and optional. Training in all academic disciplines is carried out according to curricula tailored to the specifics of the specialty and the need to synchronize Bulgarian education with European education. The training is realized through lecture courses, seminar exercises and/or practical/laboratory exercises. Through the elective and optional study disciplines, students receive theoretical and practical specialized training, according to their views on their own professional development and realization.

Specialist who graduated from the program “Medical Physics” acquires in-depth scientific-theoretical knowledge and practical skills that determine their professional purpose and are prepared to work and realize themselves as specialists in the health care system, in radiation protection and dosimetry services, medical diagnostic centers, hospitals, oncology centers, companies for medical devices and apparatus, scientific research, etc.

Students who have completed the specialty have the opportunity to continue their education in the educational qualifications “Master's Degree” and/or obtain an additional professional qualification “Physics and Astronomy Teacher”.

CURRICULUM
FIELD OF STUDY: **"MEDICAL PHYSICS"**
(Adopted in 2021)

First Year			
First Semester	ECTS credits	Second Semester	ECTS credits
Compulsory Courses		***Compulsory Courses***	
Mathematics	7,0	General Chemistry	7,5
Mechanics	8,0	Fundamentals of the Computer Technique and Technologies	7,5
Laboratory practicum in mechanics	4,0	Molecular Physics and Thermodynamics	9,0
Foreign language I	2,0	Laboratory practicum in Molecular Physics and Thermodynamics	4,0
Biology	7,0	Foreign language II	2,0
Sports	2,0		
	Total: 30		Total: 30
Second Year			
Third Semester	ECTS credits	Fourth Semester	ECTS credits
Compulsory Courses		***Compulsory Courses***	
Electricity and Magnetism	8,0	Optics	8,0
Laboratory practicum in Electricity and Magnetism	4,0	Laboratory practicum in Optics	4,0
		Theoretical mechanics	6,0
Mathematical Methods in Physics	7,0	Fundamentals of Medical Physics	6,0
Fundamentals of Human Anatomy	5,0	Fundamentals of biophysics	6,0
Metrology	4,0		
Sport	2,0		
	Total: 30		Total: 30
Third Year			
Fifth Semester	ECTS credits	Sixth Semester	ECTS credits
Compulsory Courses		***Compulsory Courses***	
Atomic physics	8,0	Nuclear physics	8,0
Laboratory practicum in atomic physics	3,0	Laboratory practicum in Nuclear Physics	3,0
Nanotechnology in medicine	5,0	Optoelectronics and application in medicine	7,0
Electrodynamics	6,0	Quantum mechanics	7,0
Radiophysics and application in medicine	6,0	Radiation protection and dosimetry	5,0
Sports	2,0		
	Total: 30		Total: 30
Fourth Year			
Seventh Semester	ECTS credits	Eighth Semester	ECTS credits
Compulsory Courses		***Compulsory Courses***	
Laser technique in medicine	6,0	Educational practice in a medical institution	4,0
Application of nuclear physics in medicine	4,0	Educational practice in National Center for Radiobiology and Radiation Protection and/or institutes of BAS	4,0
Physical methods in medicine	6,0		
Sports	2,0		
Optional Courses (students choose a total of three disciplines - two disciplines from the first group and one from the second group)		***Optional Courses (students choose a total of three disciplines - two disciplines from the third group and one from the fourth group)***	
First group	4,0	***Third group***	
Experimental methods of nuclear physics in medicine	4,0	Protection in extreme conditions	4,0
		Condensed Matter Physics	4,0
		Environmental Physics	4,0

Medical applications of particle accelerators and ionizing radiation detectors	4,0	Electromagnetic pollution	4,0
		Microprocessors and microcontrollers	4,0
Measurement of Physical Quantities			
Preparing the Physical Experiment and Processing of Experimental Data	4,0	***Fourth group***	
		Healthcare Management	4,0
Application of ultrasound in medicine	4,0	Doping and control	4,0
	4,0	Ecology	4,0
Interaction of Radiation with the Matter			
		Graduation – written state exam in physics or defense of diploma thesis	10,0
	4,0		
Second group	4,0		
Spectral analysis in medicine	4,0		
Biochemistry			
Dangerous environmental pollutants			
	Total: 30		Total: 30

TOTAL FOR 4 ACADEMIC YEARS: **240 credits**

DESCRIPTIONS OF THE COURSES

MATHEMATICS

ECTS credits: 7,0
Hours per week: 2 Lec. + 2 Sem. + 0 Lab.
Form of assessment: exam
Course Status: Compulsory course
Semester: I

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Mathematics and Natural Sciences

Short Description: The course includes basic concepts in Linear algebra – matrices, determinants, systems linear equations and methods for their solving; Analytic geometry – vectors, vector calculus; Mathematical analysis – functions of a real variable, limit of a function, differential calculation of functions, integral calculus; Ordinary differential equations; Probability theory.

Course Aims: The students have to obtain knowledge and skills to use fluently the basic mathematical concepts and apply them to solve real practical tasks in mathematics, physics and chemistry.
Teaching Methods: lectures, tutorials, homework, and problem-solving tests.

Requirements/Prerequisites: The students should have basics knowledge from school course in mathematics.

Assessment: permanent control during the semester including homework and two written exams, and written exam in the semester's end on topics from tutorials and on topics from lectures.

Registration for the exam: coordinated with the lecturer and student Service Department

MECHANICS

ECTS credits: 8.0
Hours per week: 3 Lec. + 2 Sem. + 0 Lab.
Form of assessment: Written exam
Course Status: Obligatory course
Semester: I

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Mathematics and Natural Sciences

Annotation: The university course "Mechanics" aims to provide basic knowledge in the field of mechanical phenomena that appear as foundation of physical science. In this way, students prepare for a more detailed study of the physical phenomena that are subject to specialized disciplines in the higher courses. Laboratory classes give the students practical skills for physical observations and experiment.

Course content: The material covered in the lectures includes the following sections:
- Particle kinematics
- Particle dynamics

- Work and energy,
- Laws of conservation of energy, momentum and angular momentum
- Mechanics of rigid body
- Elastic properties of bodies
- Fluid mechanics.

Technology training and assessment: The course ends in a written exam. During the period of education, students sit for written tests on the material covered in the seminars and defend protocols on the laboratory exercises. Their results are included in the formation of the final grade.

LABORATORY PRACTICUM IN MECHANICS

ECTS credits: 4.0 **Hours per week:** 0 Lec. + 0 Sem. + 3 Lab.
Form of assessment: ongoing assessment **Course Status:** Obligatory course
Semester: I

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Mathematics and Natural Sciences

Subject Description: The obligatory discipline "Laboratory Practicum in Mechanics" is an integral part of the basic course in general physics in the training of students for obtaining the educational degree "Bachelor". The practical classes give students the opportunity to experimentally study the basic physical phenomena and their application.

Specific Goals of the Subject: The course aims to gives students a necessary minimum basic knowledge about the main macroscopic physical phenomena in the field of the mechanics.

Teaching Methods: Laboratory exercises with the implementation of laboratory tasks and compilation of the respective protocols.

Requirements/Prerequisites: basic knowledge in mechanics and mathematics.

Evaluation Method: Evaluation defined by current assessment and current control of the laboratory exercises taken certain gravity.

Registration for the course: Not necessary.

Registration for the Exam: coordinated with the lecturer and Students Service Department.

FOREIGN LANGUAGE I

ECTS credits: 2,0 **Hours per week:** 0 Lec. + 2 Sem. + 0 Lab.
Evaluation: ongoing assessment **Course status:** Compulsory
Semester: I

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Mathematics and Natural Sciences

Annotation: The aim of the course "Foreign language – English" is to ensure the development of communication skills, reaching of certain phonetic, grammatical, lexical and thematic

minimum, skills and habits for participation in real, communicative situations, knowledge and individual work with vocabulary. It aims to review and systematize the basic knowledge of the undergraduates and provides equal start level for the next stage of education, called "language of the programme”. The choice of topics is based on their high particularly in the scientific style of speech and their unconditional structural significance and necessity of learning a foreign language. Widely used communicative exercises focus that strengthen the necessary grammatical habits and encourage students to be active speech activity in the studied subjects. The practical course is based on the thematic texts reflecting everyday student life, elementary special technical terminology on the subject and aims to stimulate the desire and motivation of students to enhance their language and consistent level – Elementary and Pre-intermediate.

Purpose of the course: The aim of the course is to build an initial communicative competence, as the ability to understand and draw meaningful oral and written statements, in accordance with the rules of the English language to develop reading skills and comprehension of texts from everyday communication and presentation and related texts the basic terms in the specialty; develop skills in physical vocabulary can make translations of physical texts from English Into Bulgarian language using a dictionary.

Educational Methods: Active methods are used through different exercises; based tests are made for control of the learned, translation of physical literature.

BIOLOGY

ECTS credits: 7,0
Hours per week: 2 Lec. + 0 Sem. + 2 Lab.
Form of assessment: Written exam
Course Status: Compulsory
Semester: I

Methodological guidance:
Department of Geography, Ecology and Environmental Protection,
Faculty of Mathematics and Natural Sciences

Course Description: The course in Biology includes the study of fundamental issues of biology as a system of fundamental and taxonomic sciences, which are at the core of agriculture and forestry, medicine and biotechnology. It is emphasized on the characteristics of the cell - prokaryotic and eukaryotic, as a basic structural and functional unit of the organisms, the characteristics of the plant tissues and organs, the classification of the organisms. Attention is drawn to the main physiological processes in the organisms - photosynthesis and respiration, heredity and variation, and the more important biotechnology.

Course Aims: The course in Biology is designed to present the basic knowledge about the different forms of organization of living matter, the classification of living organisms, the basic physiological processes, the organization of genetic material, the genetic engineering, the achievements and perspectives of plan biotechnologies etc. The main tasks are directed towards acquiring knowledge for the structure and functioning of living systems, and gaining research skills.

Teaching Methods: lectures and laboratory work.

Requirements/Prerequisites: No prerequisites.

Assessment: written final exam (final test), one test during the semester, and a course assignment.

Registration for the Course: by request at the end of the semester.

Registration for the Exam: coordinated with the lecturer and the Student Service Department.

GENERAL CHEMISTRY

ECTS credits: 7,5
Hours per week: 2 Lec. + 0 Sem. + 2 Lab.
Form of assessment: Written exam
Course Status: Compulsory
Semester: II

Methodological guidance:
Department of Chemistry,
Faculty of Mathematics and Natural Sciences

Annotation: The course "General Chemistry" for students of specialty is targeted on development of basic chemical background in relation to the knowledge formed in other subjects from the curriculum. The selected topics have also practical orientation connected with the useful facts for important materials and chemical processes.

Course content: Structure of atoms; Periodic law and periodic table of elements; Structure of molecules – ionic and covalent bond; Intermolecular interactions. H-bond; Chemical bond in solid matter; Basics of thermodynamics; Chemical kinetics; Chemical equilibrium; Adsorption; Catalysis; Solutions and solubility; Theory of diluted solutions; Theory of electrolytic dissociation; Electrochemistry. Galvanic and electrolysis cells; Hydrogen; Overview of IA to IVA groups of the periodic table; Overview of VA to VIIIA groups of the periodic table; Transition metals chemistry

Technology of education and grading: The course includes lectures and labs. During semester the students must overpass 2 tests on the lecture material and 2 tests on the practical material. The course finishes with a written exam.

FUNDAMENTALS OF THE COMPUTER TECHNIQUE AND TECHNOLOGIES

ECTS credits: 7,5
Weekly workload: 2 Lec. + 0 Sem. + 2 Lab.
Form of assessment: Current assessment
Statute of the course: Compulsory
Semester: II

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Mathematics and Natural Sciences

Annotation: The course "Fundamentals of the Computer Technique and Technologies" is included as compulsory course in the specialty curriculum "Medical Physics". It is studied from students studying at educational and qualification degree "Bachelor".

The course "Fundamentals of the Computer Technique and Technologies" is with total workload 60 hours laboratory exercises. The students' self-study is 165 hours.

Teaching on the course "Fundamentals of the Computer Technique and Technologies" has theoretic-applied character.

Current control of the students' educational achievements is carried out during the semester in the hours of laboratory exercises.

Course content:

1. Introduction to databases.
2. Introduction to Microsoft Office Access 2010. Creating databases.
3. Creating tables in databases.
4. Data input in tables of databases.
5. Providing and maintaining the data integrity in databases.
6. Creating links between tables in databases.
7. Creating queries in databases.
8. Creating forms in databases.
9. Creating controls in forms and subforms to the forms in databases.
10. Creating reports in databases.
11. Creating macros in databases.
12. Creating switchboard in databases.
13. Creating indexes in tables of databases.
14. Application of the databases.

Teaching methods and evaluation:

To conduct the laboratory exercises is used the material base of the department of Physics (computer laboratory). The laboratory exercises are conducted in groups. Each student has workplace. Students work individually and they perform the practical tasks, which are described in the methodological guidelines and discussed in advance with the assistant. The laboratory exercise is considered done after presentation and defense of the performance of assigned tasks.

Certification of the semester get students who have done all laboratory exercises and who have received an evaluation of the current control at least "Satisfied 3" (D).

Teaching on the course "Fundamentals of the Computer Technique and Technologies" ends with a current assessment. The current assessment is the evaluation of the current control that is conducted during the laboratory exercises.

MOLECULAR PHYSICS AND THERMODYNAMICS

ECTS credits: 9.0 **Hours per week:** 3 Lec. + 2 Sem. + 0 Lab.
Form of assessment: Written exam **Course Status:** Obligatory course
Semester: II

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Mathematics and Natural Sciences

Subject Description: The main topics to be considered:

- Bases of equilibrium thermodynamics
- Thermodynamic and statistical interpretation of basic thermodynamic quantities
- Surface tension
- Variation of physical condition
- Elements of non-equilibrium thermodynamics. Transmission processes – diffusion, thermal conductivity and internal friction.

Specific Goals of the Subject: The course aims to gives students a necessary minimum basic knowledge about the main macroscopic physical phenomena in the field of the thermodynamics and molecular physics. Some practical applications of this knowledge are an object of treatment in laboratory exercises and seminars.

Teaching Methods: lectures, laboratory exercises, tutorials, individual student's work, test-papers.

Requirements/Prerequisites: basic knowledge in mechanics and mathematics.

Evaluation Method: Evaluation defined by a written exam and current control of the seminar exercises taken certain gravity. Some intermediate tests conduct through the semester.

Registration for the course: Not necessary.

Registration for the Exam: coordinated with the lecturer and Students Service Department.

Note: The lecture course is suitable for students of all natural and technical sciences.

LABORATORY PRACTICUM IN MOLECULAR PHYSICS AND THERMODYNAMIC

ECTS credits: 4.0
Hours per week: 0 Lec. + 0 Sem. + 3 Lab.
Form of assessment: Current assessment
Course Status: Obligatory course
Semester: II

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Mathematics and Natural Sciences

Subject Description: The obligatory discipline "Laboratory Practicum in Molecular Physics and Thermodynamic" is an integral part of the basic course in general physics in the training of students for obtaining the educational degree "Bachelor". The practical classes give students the opportunity to experimentally study the basic physical phenomena and their application.

Specific Goals of the Subject: The course aims to gives students a necessary minimum basic knowledge about the main macroscopic physical phenomena in the field of the thermodynamics and molecular physics.

Teaching Methods: Laboratory exercises with the implementation of laboratory tasks and compilation of the respective protocols.

Requirements/Prerequisites: basic knowledge in mechanics and mathematics.

Evaluation Method: Evaluation defined by current assessment and current control of the laboratory exercises taken certain gravity.

Registration for the course: Not necessary.

Registration for the Exam: coordinated with the lecturer and Students Service Department.

FOREIGN LANGUAGE II

ECTS credits: 2,0
Hours per week: 0 Lec. + 2 Sem. + 0 Lab.
Evaluation: ongoing assessment
Course status: Compulsory
Semester: II

Methodological guidance:

Department of Mathematics and Physics,
Faculty of Mathematics and Natural Sciences

Annotation: The aim of the course „Foreign language – English” is to ensure the development of communication skills, reaching of certain phonetic, grammatical, lexical and thematic minimum, skills and habits for participation in real, communicative situations, knowledge and individual work with vocabulary. It aims to review and systematize the basic knowledge of the undergraduates and provides equal start level for the next stage of education, called "language of the programme”. The choice of topics is based on their high particularly in the scientific style of speech and their unconditional structural significance and necessity of learning a foreign language. Widely used communicative exercises focus that strengthen the necessary grammatical habits and encourage students to be active speech activity in the studied subjects. The practical course is based on the thematic texts reflecting everyday student life, elementary special technical terminology on the subject and aims to stimulate the desire and motivation of students to enhance their language and consistent level – Elementary and Pre-intermediate.

Purpose of the course: The aim of the course is to build an initial communicative competence, as the ability to understand and draw meaningful oral and written statements, in accordance with the rules of the English language to develop reading skills and comprehension of texts from everyday communication and presentation and related texts the basic terms in the specialty; develop skills in physical vocabulary can make translations of physical texts from English Into Bulgarian language using a dictionary.

Educational Methods: Active methods are used through different exercises; based tests are made for control of the learned, translation of physical literature.

ELECTRICITY AND MAGNETISM

ECTS credits: 8.0 **Hours per week:** 3 Lec. + 2 Sem.+ 0 Lab.
Evaluation Method: Written examination **Course status:** Compulsory
Semester: III

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Natural Sciences & Mathematics

Annotation: The course "Electrical and Magnetism" is compulsory for the specialty and is aimed at providing the basic preparation in the field of experimental physics and creates a foundation for learning the material taught in the basic physical disciplines in the above courses. The subject deals with the basic laws of electrical and magnetic phenomena. The practical exercises enable students to experimentally explore the basic physical phenomena and their application.

Subject Description: The course considers the general laws of electrical and magnetic phenomena. The first part studies basic laws of electrical phenomena such as electromotive force, electric fields, electrical potential, Gauss law, dielectrics and metals in electrical field, conductors, and electrical current. The second part considers magnetic phenomena and includes field of moving charge, electrical dipole, magnetic forces, electromagnetic induction, and magnetic properties of mater. The third section concerns questions of movement of the electrical parts in electric and magnetic fields.

Pedagogical methods and type of evaluation: Lectures are visualized by demonstrations and laboratory tasks performance during the laboratory classes. From methods point of view teaching material is grouped in sections following logical consistency of the cause. Final examination is in written form. Some intermediate tests conduct through the semester

LABORATORY PRACTICUM IN ELECTRICITY AND MAGNETISM

ECTS credits 4
Hours per week: 3 Lab.
Evaluation Method: Current semester grade.
Status of the Subject: Compulsory
Semester: III

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Natural Sciences & Mathematics

Annotation: The course aims to expand students' knowledge of the basic laws describing electrical and magnetic phenomena by acquiring habits and skills for practical measurement of electrical and magnetic quantities. It is the basis for other courses studied at the Faculty of Natural Sciences and Mathematics, such as Optics, including electromagnetic theory of light, Electrodynamics, Radiophysics and Electronics, Photovoltaics and more.

Subject Description: The course considers the basic laws of electrical and magnetic phenomena. Includes the implementation of laboratory exercises on topics illustrating the lecture material in the discipline of Electricity and Magnetism. Current flow in different media, electrical properties of different materials are studied, experimental verification of basic electrical laws is performed, alternating current circuits, electric oscillating circuit, etc. are studied.

Evaluation Methods: Laboratory tasks performance during the laboratory classes.

MATHEMATICAL METHODS IN PHYSICS

ECTS credits: 7.0
Workload per week: 2 Lec. + 2 Sem. + 0 Lab.
Form of assessment: Written exam
Course Status: Obligatory course
Semester: III

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Natural Sciences & Mathematics

Annotation: The course aims to give fundamental knowledge in Mathematical Physics and to serve as a foundation for courses in Theoretical Physics, Quantum Electronics, Astrophysics and other special-purpose courses.

Course content: The course deals with material from various chapters of Mathematical Analysis:

1. Vector and Tensor Analysis.
2. Ordinary differential equations.
3. Systems of ordinary differential equations.

Technology trainingandassessment: The course ends in a written exam which is held in two parts: problems and a written theoretical exposition. During the period of education students sit

for written tests on the material covered in the seminars. Their results are included in the formation of the final grade.

FUNDAMENTALS OF HUMAN ANATOMY

ECTS credits: 5.0
Hours per week: 2 Lec. + 0 Sem. + 1 Lab.
Form of assessment: писмен изпит
Course Status: Compulsory course
Semester: III

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Mathematics and Natural Sciences

Short Description: The discipline aims to provide fundamental training in one main direction - studying the forms and structure of the human organism and its functioning and normal development with an emphasis on basic knowledge and conceptual framework regarding skeletal-muscular functions, cardiorespiratory system, sensory and hormonal regulations, at rest and during static and dynamic physical exertion of the body.

Course Aims: The course "Fundamentals of Human Anatomy" aims to provide fundamental training related to the structure and function of the human organism. The program provides for familiarization with the structure of tissues, organs and systems in the body, considered in their unity and development. Attention is paid to their mutual spatial arrangement, blood supply and innervation. Attention is paid to the musculoskeletal system - bone and muscular system, joint apparatus and the structure and function of various muscle groups, in the context of locomotion and physical exertion. The structure and main functions of the nervous system, its ontogenetic development, age-related changes, the structure of neurons, the brain matter, the relevant peripheral nerves responsible for the movement of the human body, as well as the structure of the brain and its main divisions are examined in detail. The sensory functions of the nervous system are studied: visual, auditory and vestibular, gustatory, olfactory, somatosensory system. Also examined are: the anatomical and functional organization of the walls of blood vessels (arteries, veins and capillaries), the structural organization of blood circulation (pulmonary and systemic, coronary and portal), the anatomy and functional organization of the heart and heart cavities, the hematopoietic and lymphatic systems, the digestive system. Also examined in detail are: - the respiratory system and muscles related to inspiration and expiration, changes during physical exertion and aging; - the endocrine system and the pituitary-hypothalamus-adrenal axis, such as stress-induced reactivity; - the excretory system and the conceptual apparatus of glomerular filtration, reabsorption and secretion; also - the male and female reproductive systems.

METROLOGY

ECTS credits: 4,0
Weekly workload: 2 Lec. + 1 Sem. + 0 Lab.
Form of assessment: Written exam
Statute of the course: Compulsory
Semester: III

Departments involved:
Department of Mathematics and Physics,
Faculty of Mathematics and Natural Sciences

Annotation: The course "Metrology" is included as compulsory course in the specialty curriculum "Medical Physics". It is studied from students studying at educational and qualification degree "Bachelor".

The course "Metrology" is with total workload 45 hours, which includes 30 hours lectures and 15 hours laboratory exercises. The students' self-study is 75 hours.

Current control of the students' educational achievements is carried out during the semester in the hours of laboratory exercises. Teaching on the course ends with a written exam.

Course content:

1. Introduction to general metrology. Historical development and significance of metrology.
2. Parts of metrology.
3. Normative documents in metrology.
4. Physical quantities and units of measurement.
5. Standards.
6. Precision and Errors.
7. Measuring instruments. Main characteristics.
8. Basic measurements in metrology.
9. Metrological control of the measuring instruments.
10. Standardization and certification in metrology.

Teaching methods and evaluation: Lectures are held in a lecture hall, that is equipped with the necessary technique – computer and multimedia projector, using the computer presentations, which are developed in accordance with the educational content of the lectures.

To conduct the laboratory exercises is used the laboratory "Metrology". The laboratory exercises are conducted in groups. Students work in subgroups of 2–3 persons at workplace and they perform the practical tasks, which are described in the methodological guidelines and discussed in advance with the assistant. After each conducted laboratory exercise students prepare protocol. The laboratory exercise is considered done after submission and defense of the relevant protocol. Certification of the semester get students who have done all laboratory exercises, who have submitted and defended the relevant protocols and who have received an evaluation of the current control at least "Satisfied 3" (D).

Teaching on the course "Metrology" ends with a written exam on the educational content. A final evaluation is formed only if the student has received an evaluation of the written exam at least "Satisfied 3" (D). In forming of the final evaluation are reported the evaluations from the written exam (40 %) and from the current control (60 %).

OPTICS

ECTS credits: 8.0 **Type of presentation:** 3 Lec. +2 Sem. +0 Lab.
Evaluation Method: Written examination **Status of the Subject:** Compulsory
Semester: IV

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Natural Sciences & Mathematics

Annotation: The course "Optics" is compulsory for the specialty and is aimed at providing the basic preparation in the field of experimental physics and creates a foundation for learning the material taught in the basic physical disciplines in the above courses. The subject deals with the basic laws of optical. The practical exercises enable students to experimentally explore the basic physical phenomena and their application.

Subject Description: The course considers optics phenomena on the base of theory of electromagnetic wave propagation. It starts with Maxwell's equations and describes the general

properties of the light waves. Particular attention is paid to such phenomena as refraction on the dielectric and metal surface, total internal refraction. Important part of the course is the consideration of the interference and the diffraction of the light, some types of interferometers and principles of the working of diffractive gratings. In addition the basic principles of geometric optics are present.

Pedagogical methods and type of evaluation: Lectures are visualized by demonstrations and laboratory tasks performance during the laboratory classes. From methods point of view teaching material is grouped in sections following logical consistency of the cause. Final examination is in written form. Some intermediate tests conduct through the semester.

LABORATORY PRACTICUM IN OPTICS

ECTS credits 4
Hours per week: 0 Lec./ 0 Sem./ 3 Lab.
Evaluation Method: Current semester grade.
Status of the Subject: Compulsory
Semester: IV

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Natural Sciences & Mathematics

Annotation: The course aims to expand students' knowledge of the basic phenomena and laws of light propagation by creating skills and habits for experimental study of these phenomena and practical determination of the values of quantities describing these phenomena. The course provides the basis for further specialized courses such as Quantum Electronics, Optical Communications and others.

Subject Description: The course deals with the issues of wave optics based on Maxwell's electro-magnetic theory of light. It includes the implementation of laboratory exercises on topics illustrating the lecture material in the discipline of Optics. Laboratory exercises include topics related to the basic properties of light, reflection and refraction of light at the boundary of two dielectrics, total internal reflection, light interference, diffraction phenomena, the principle of operation of diffraction gratings, geometric optics.

Pedagogical Methods: Laboratory exercises, consisting of elaboration of laboratory tasks on established laboratory installations and compilation of the respective protocols.

Subsidiary Materials: Educational literature on General and Applied Physics and printed materials on the topics given by lecturer.

Evaluation Method: Laboratory tasks performance during the laboratory classes.

THEORETICAL MECHANICS

ECTS credits: 6
Workload per week: 2 Lec. + 2 Sem. + 0 Lab.
Evaluation Method: Written exam
Statute of the Subject: Compulsory
Semester: IV

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Natural Sciences and Mathematics

Annotation: Students acquire knowledge about basic principles and properties of the classical mechanical phenomena. The course gives a base for others special courses such as Electrodynamics, Quantum mechanics, Atomic physics etc.

Course content: The course considers theoretical bases of Classical Mechanics. The development follows where possible the axiomatic lines, the Newton's concepts of time and space and the variational principle in its Lagrangian and Hamiltonian forms. The equations of motions are derived from these principles. The mechanical systems of harmonic oscillator, particle in central field and solid body are considered in greater detail. A stress is put on the equations of motion, conservation laws and Galilean relativity in mechanics.

Pedagogical Methods and type of evaluation: Lectures and seminar classes. During the seminar classes students solve varied problems on mechanical systems and their description. Parts of topics with practical importance are directed to the seminar classes. Basic knowledge in General Physics and Mathematical Calculus are needed.
The course is completed by a written examination. Some intermediate tests are conducted through the semester.

FUNDAMENTALS OF MEDICAL PHYSICS

ECTS credits: 6
Workload per week: 2 Lec. + 2 Sem. + 0 Lab.
Evaluation Method: Written exam
Statute of the Subject: Compulsory
Semester: IV

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Natural Sciences and Mathematics

Subject Description: The principles and applications of basic diagnostic and therapeutic techniques are considered. The knowledge is built on the lessons learned from the general, basic courses studied in previous semesters of the bachelor's program, and the most widely used modern methods are mainly considered. The multifaceted application of physical knowledge, methods and equipment in medicine is shown. The biophysical bases of the therapeutic action of electromagnetic waves in their impact at the cellular, tissue, organ and systemic levels on living organisms are presented.

Specific Goals of the Subject: The aim of the course is for students to acquire lasting knowledge of the basic principles on which modern medical devices operate, their capabilities for diagnosis and treatment and advantages over traditional means. The course demonstrates the direct practical application of the laws of physics in medicine and biology and shows the relationship between theory and practice. In this way, the aim is to form a way of thinking that perceives natural phenomena as interconnected and interdependent processes.

Teaching Methods: lectures, tutorials, individual student's work

Requirements/Prerequisites: General knowledge in mathematical methods of physics and analysis

Evaluation Method: Evaluation defined by a written exam and current control of the laboratory exercises taken certain gravity. Some intermediate tests conduct through the semester.

Registration for the course: by request at the end of the current semester.

Registration for the Exam: coordinated with the lecturer and Students Service Department.

FUNDAMENTALS OF BIOPHYSICS

ECTS credits: 6,0
Weekly workload: 2 Lec. + 2 Sem. + 0 Lab.
Form of assessment: Written exam
Statute of the course: Obligatory
Semester: IV

Departments involved:
Department of Mathematics and Physics,
Faculty of Mathematics and Natural Sciences

Annotation: The course "Fundamentals of biophysics" is included as elective course in the specialty curriculum "Medical Physics". It is studied from students studying at educational and qualification degree "Bachelor".

The course "Fundamentals of biophysics" is with total workload 60 hours, which includes 45 hours lectures and 15 hours seminars. The students' self-study is 120 hours.

Teaching on the course "Fundamentals of biophysics" has theoretic-applied character.

Current control of the students' educational achievements is carried out during the semester in the hours for seminars.

Teaching on the course ends with a written exam.

Course content:

1. Introduction to Biophysics.
2. Biothermodynamics.
3. Biomechanics.
4. Biological and artificial membranes.
5. Transport of substances through biomembranes.
6. Electrical properties of cells and tissues.
7. Nanotechnologies in Biophysics.

Teaching methods and evaluation: Lectures are held in a lecture hall, that is equipped with the necessary technique – computer and multimedia projector, using the computer presentations, which are developed in accordance with the educational content of the lectures.

To conduct the seminars are used variety of didactic materials – computer presentations, electronic visual materials, tasks and other.

Certification of the semester get students who have received an evaluation of the current control at least "Satisfied 3" (D).

Teaching on the course "Fundamentals of biophysics" ends with a written exam on the educational content. A final evaluation is formed only if the student has received an evaluation of the written exam at least "Satisfied 3" (D). In forming of the final evaluation are reported the evaluations from the written exam (60 %) and from the current control (40 %).

ATOMIC PHYSICS

ECTS credits: 8.0
Workload per week: 3 Lec. + 2 Sem. + 0 Lab.
Evaluation Method: Written exam
Statute of the Subject: Compulsory
Semester: V

Methodological guidance:

Department of Mathematics and Physics,
Faculty of Natural Sciences & Maths

Annotation: The subject is a compulsory course studied by students to acquire a Bachelor degree on Physics. The students acquire basic knowledges required about Atomic and Molecular Physics. Material is selected depending of the specificity of the speciality. For that reason some specific topics are presented which are not included in the Physics programme for non-physical students. Material is selected depending of the specificity of the speciality. For that reason some specific topics are presented which are not included in the Physics programme for non-physical students.

Course content: Basic concepts and definitions in metrology. Dimension and units of physical quantities. Systems units. Accuracy and error. Measuring devices. Processing of measurement results. Categories and types of standards.

Pedagogical Methods and type of evaluation: Basic knowledge in General Physics, Mathematics and Thermal Physics are needed. Lectures are visualised by demonstrations and laboratory tasks performance during the laboratory classes. From methods point of view teaching material is grouped in sections by logical consistency from Structure of Atoms and Atomic Models via Interaction of Atoms with External Electric and Magnetic Fields to Fine and Hyperfine Structure and the nature of Chemical Bonds. Practical topics are directed to the laboratory classes.
The course is completed by a written examination. Some intermediate tests are conducted through the semester.

LABORATORY PRACTICUM IN ATOMIC PHYSICS

Semester: 5 semester
Cours Tipe: laboratory exercises
Hours per week/FS/SS: 2 laboratory hours per week/SS
ECTS credits: 4 credits

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Natural Sciences & Maths

Status of the Subject: Obligatory course

Subject Description: The obligatory discipline "Laboratory Practicum in Atomic Physics" is an integral part of the basic course in general physics in the training of students for obtaining the educational degree "Bachelor". The practical classes give students the opportunity to experimentally study the basic physical phenomena and their application.

Specific Goals of the Subject: Students acquire basic knowledges required about Atomic and Molecular Physics. Material is selected depending of the specificity of the specialty.

Teaching Methods: Laboratory exercises with elaboration of laboratory tasks and compilation of the respective protocols. From a methodological point of view, the material is grouped into sections, following the logical sequence from quantum mechanical theory to atomic physics.

Requirements/Prerequisites: in General Physics and Maths.

Evaluation Method: Evaluation defined by current assessment and current control of the laboratory exercises taken certain gravity. Some intermediate tests conduct through the semester.

Registration for the course: Not necessary.

Registration for the Exam: coordinated with the lecturer and Students Service Department.

NANOTECHNOLOGY IN MEDICINE

ECTS credits: 4,0
Weekly workload: 2 Lec. + 0 Sem. + 1 Lab.
Form of assessment: Written exam
Statute of the course: Compulsory
Semester: VI

Departments involved:
Department of Mathematics and Physics,
Faculty of Mathematics and Natural Sciences

Subject Description: The program contains materials for basic data on the nanoscale state of substances, experimental methods for their preparation, important methods for characterizing their nanoscale state is their unique physical properties, which they exhibit compared to bulk materials.
The practical classes consist in the students getting acquainted with the basic experimental methods for obtaining and researching nano materials and the methods for researching their main characteristics.

Specific Goals of the Subject: The aim of the course is for students to acquire knowledge of basic concepts in the field of nanotechnology and research methods of nanoscale materials.

Teaching Methods: lectures, tutorials, individual student's work

Requirements/Prerequisites: General knowledge in mathematical methods of physics and analysis

Evaluation Method: Evaluation defined by a written exam and current control of the laboratory exercises taken certain gravity. Some intermediate tests conduct through the semester.

Registration for the course: by request at the end of the current semester.

Registration for the Exam: coordinated with the lecturer and Students Service Department.

ELECTRODYNAMICS

ECTS credits: 6.0
Workload per week: 2 Lec. + 2 Sem. + 0 Lab.
Evaluation Method: Written exam
Statute of the Subject: Compulsory
Semester: V

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Mathematics and Natural Sciences

Annotation: Students acquire knowledge about basic principles and properties of the classical electromagnetic field. The course gives a base for others courses such as Quantum mechanics, Atomic physics, Astrophysics.

Course content: The course considers theoretical bases of classical electrodynamics, the main features of the special theory of relativity being studied first. This allows later apply the Lagrange variational principle to derive the Maxwell equations in their relativistic covariant form and to obtain the field invariants. The more detailed properties of the field are studied on the base of three dimensional form of Maxwell equations, considering first the free field in vacuum, then field with sources and finally field in continuous media, including the nonlinear media.

Pedagogical Methods and type of evaluation: Lectures and seminar classes. During the seminar classes students solve varied problems on mechanical systems and their description. Parts of topics with practical importance are directed to the seminar classes. Basic knowledge in General Physics and Mathematical methods are needed.
The course is completed by a written examination. Some intermediate tests are conducted through the semester.

RADIOPHYSICS AND APPLICATION IN MEDICINE

ECTS credits 6.0
Hours per week: 2 Lec./ 2 Lab.
Evaluation Method: Written examination. Some intermediate tests conduct through the semester.
Status of the Subject: Compulsory
Semester: V

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Mathematics and Natural Sciences

Annotation: The course aims to familiarize students with the basic laws describing AC circuits and electromagnetic and waves.

Subject Description: Course "Radio physics" is compulsory for specialty and aims to provide basic training in the physics of wave processes. It is dedicated to the study of electromagnetic oscillations and resonance phenomena occurring in electrical circuits, as well as basic characteristics of electromagnetic waves.

Pedagogical Methods: Lectures are visualized by demonstrations and laboratory tasks performance during the laboratory classes. From methods point of view teaching material is grouped in sections following logical consistency of the cause.

Subsidiary Materials: Educational literature on General and Applied Physics and printed materials on the topics given by lecturer.

Evaluation Method: Final examination in written form. Some intermediate tests conduct through the semester.

NUCLEAR PHYSICS

ECTS credits: 8.0 **Workload per week:** 3 Lec. + 2 Sem.+ 0 Lab.
Evaluation Method: Written examination **Statute of the Subject:** Compulsory
Semester: VI

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Natural Sciences & Maths

Annotation: The subject is a compulsory course studied by students to acquire a Bachelor degree on Physics. Students acquire basic knowledges required about Nuclear and Neutron Physics and Radiation Safety. Material is selected depending of the specificity of the speciality. For that reason some specific topics are presented which are not included in the Physics programme for non-Physical subjects. Material is selected depending of the specificity of the speciality.

Course content: Subject Description: Basic concepts of Nuclear Physics. Nuclear structure. Nuclear models. Nuclear Forces. Isotopic Spin. Parity Violation. Nuclear reactions. Fission. Fusion. Scattering theory. Neutron Physics. Accelerators. Nuclear reactors. Radiation α, β and γ. Basic concepts of Radiation Safety.

Pedagogical Methods and type of evaluation: Basic knowledge in General Physics, Mathematics and Thermal Physics are needed. Lectures are visualised by demonstrations and laboratory tasks performance during the laboratory classes. From methods point of view teaching material is grouped in sections by logical consistency from Structure of Nuclei and Nuclear Models via Nuclear reactions, Neutron Physics to Radiation and Radiation Safety. Practical topics are directed to the laboratory classes.
The course is completed by a written examination. Some intermediate tests are conducted through the semester.

LABORATORY PRACTICUM IN NUCLEAR PHYSICS

Semester: 6 semester
Cours Tipe: laboratory exercises
Hours per week/FS/SS: 2 laboratory hours per week/SS
ECTS credits: 3 credits

University/Faculty/Department: SWU "Neofit Rilsky"-Blagoevgrad; 66 Ivan Mihailov Blvd./ Natural Sciences & Mathematics/ Mathematics and Physics

Status of the Subject: Obligatory course

Subject Description: The obligatory discipline "Laboratory Practicum in Nuclear Physics" is an integral part of the basic course in general physics in the training of students for obtaining the educational degree "Bachelor". The practical classes give students the opportunity to experimentally study the basic physical phenomena and their application.

Specific Goals of the Subject: Students acquire basic knowledges required about Atomic and Molecular Physics. Material is selected depending of the specificity of the speciality.

Teaching Methods: Laboratory exercises with elaboration of laboratory tasks and compilation of the respective protocols. From methods point of view teaching material is grouped in sections

by logical consistency from Structure of Nuclei and Nuclear Models via Nuclear reactions, Neutron Physics to Radiation and Radiation Safety. Parts of topics with practical importance are directed to the laboratory classes.

Requirements/Prerequisites: Basic knowledge in Atomic Physics & Maths.

Evaluation Method: Evaluation defined by current assessment and current control of the laboratory exercises taken certain gravity. Some intermediate tests conduct through the semester.

Registration for the course: Not necessary.

Registration for the Exam: coordinated with the lecturer and Students Service Department.

OPTOELECTRONICS AND APPLICATION IN MEDICINE

ECTS credits: 7.0
Type of presentation: 3 Lec. + 0 Sem. + 1 Lab.
Evaluation Method: Written examination
Status of the Subject: Compulsory
Semester: VI

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Natural Sciences & Mathematics

Annotation: Students acquire knowledge about general principles of light wave communication system as most attractive communication system in last years.

Subject Description: The course considers physical principles optical communication system. The basic topics are waveguide light wave propagation, formation of waveguide's modes, step index fibers, graded index fibers, single mode fibers, intermodal dispersion, material and waveguide dispersion in single mode fibers, fiber loss, methods for fabrication and parameters control, optical sources and transmitters including semiconductor lasers and light emitting diodes, optical detectors and receivers, optical amplifiers and system design and performance, passive optical system components.

Pedagogical Methods: Lectures are visualized by demonstrations. During the seminar classes students solve varied problems on optics

QUANTUM MECHANICS

ECTS credits: 7.0
Workload per week: 2 Lec. +2 Sem. + 0 Lab.
Evaluation Method: Written exam
Statute of the Subject: Compulsory
Semester: VI

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Natural Sciences and Mathematics

Annotation: The course aims at giving fundamentals knowledge of quantum physics and to serve as a foundation for courses as statistical physics, quantum electronics astrophysics and other special courses.

Course content: Basic quantum mechanical postulates. Quantum mechanical formalism: state space and Hermitean operators. Schrodinger equation: exactly solvable models: Hydrogen atom, harmonic oscilator, potential well. Approximate methods: perturbation theory, Hartry-Fock method. Identical particles and Pauli principle. Angular momentum and spin. Many-electron atoms and periodic system of elements. Scattering theory and Rutherford formula. Klein-Gordon and Dirac equations.

Pedagogical Methods and type of evaluation: Lectures and seminar classes. Basic knowledge in General Physics and Mathematical methods are needed.
The course is completed by a written examination. Some intermediate tests are conducted through the semester.

RADIATION PROTECTION AND DOSIMETRY

ECTS credits: 5.0
Workload per week: 2 Lec. +1 Sem. + 0 Lab.
Evaluation Method: Written exam
Statute of the Subject: Compulsory
Semester: VI

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Mathematics and Natural Sciences

Subject Description: The program contains material on the peculiarities of dosimetry in the clinical practice of nuclear medicine, basic dosimetric values, methods and devices for registering and measuring radiation, the current regulatory framework in our country in the field of radiation protection, as well as the rules for action in the event of radiation incidents or accidents. Practical classes are seminar exercises and give students the opportunity to examine in more detail the main topics covered in their studies.

Specific Goals of the Subject: The course aims at giving fundamentals knowledge of the action of ionizing radiation, the main dosimetric quantities, etc.

Teaching Methods: lectures, tutorials, individual student's work

Requirements/Prerequisites: General knowledge in mathematical methods of physics, atomic physics, etc.

Evaluation Method: Evaluation defined by a written exam and current control of the seminars taken certain gravity. Some intermediate tests conduct through the semester.

Inscribing for tuition: Not necessary.

Inscribing for exam: Agreement with the lecturer.

LASER TECHNIQUE IN MEDICINE

ECTS credits 6
Hours per week: 2 Lec./ 2 Lab.
Evaluation Method: Written examination. Some intermediate tests conduct through the semester.
Status of the Subject: Compulsory
Semester: VII

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Mathematics and Natural Sciences

Annotation: The course aims to familiarize students with the most modern light sources - lasers, which having some properties as coherence and great power and demonstrate their application in science and technology**.**

Subject Description: The course considers the physical basics of laser technique and the principle of action of the most common laser sources. The physical principles of amplification and generation of light based on induced radiation are discussed. The course also describes laser resonators, principles of operation of gas and solid-state lasers as well as some tunable laser sources.

Pedagogical Methods: Educational literature on Quantum electronics and Laser systems and printed materials on the topics given by lecturer.

APPLICATION OF NUCLEAR PHYSICS IN MEDICINE

Semester: 7 semester
Cours Tipe: Lectures and tutorials
Hours per week/FS/SS: 2 lecture hours, 1 tutorial hours per week/SS
ECTS credits: 4 credits

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Natural Sciences and Mathematics

Status of the Subject: Compulsory

Subject Description: The course "Application of nuclear physics in medicine" is mandatory for the specialty "Medical Physics". The program contains materials for types of radioactivity, the application of X-rays and gamma rays in medical diagnostics, methods and devices for radionuclide imaging.

Specific Goals of the Subject: The course aims at giving fundamentals knowledge of applied aspect of nuclear physics in medicine.

Teaching Methods: lectures, tutorials, individual student's work

Requirements/Prerequisites: General knowledge in mathematics, atomic and nuclear physics

Evaluation Method: Evaluation defined by a written exam and current control of the seminars taken certain gravity. Some intermediate tests conduct through the semester.

Inscribing for tuition: Not necessary.

Inscribing for exam: Agreement with the lecturer.

PHYSICAL METHODS IN MEDICINE

ECTS credits: 6.0 **Workload per week:** 2 Lec. + 0 Sem. + 2 Lab.
Evaluation Method: Written exam **Statute of the Subject:** Compulsory
Semester: VII

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Natural Sciences and Mathematics

Subject Description: The principles and applications of basic diagnostic and therapeutic techniques are considered. The knowledge is built on the lessons learned from the general, basic courses studied in previous semesters of the bachelor's program, and the most widely used modern methods are mainly considered. The multifaceted application of physical knowledge, methods and equipment in medicine is shown. The biophysical bases of the therapeutic action of electromagnetic waves in their impact at the cellular, tissue, organ and systemic levels on living organisms are presented.

Specific Goals of the Subject: The aim of the course is for students to acquire lasting knowledge of the basic principles on which modern medical devices operate, their capabilities for diagnosis and treatment and advantages over traditional means. The course demonstrates the direct practical application of the laws of physics in medicine and biology and shows the relationship between theory and practice. In this way, the aim is to form a way of thinking that perceives natural phenomena as interconnected and interdependent processes.

Teaching Methods: lectures, tutorials, individual student's work

Requirements/Prerequisites: General knowledge in mathematical methods of physics and analysis

Evaluation Method: Evaluation defined by a written exam and current control of the laboratory exercises taken certain gravity. Some intermediate tests conduct through the semester.

Registration for the course: by request at the end of the current semester.

Registration for the Exam: coordinated with the lecturer and Students Service Department.

EDUCATIONAL PRACTICE IN A MEDICAL INSTITUTION

ECTS credits: 4.0 **Workload per week:** 0 lec. +0 Sem. + 3 Lab.
Evaluation Method: Written exam **Statute of the Subject:** Compulsory
Semester: VI

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Natural Sciences and Mathematics

Subject Description: The discipline "Educational practice in a medical institution" is included as mandatory in the curriculum of the specialty "Medical Physics". It takes place in the eighth semester after the lectures on Nuclear Physics, Application of Nuclear Physics in Medicine and Radiation Protection and Dosimetry. Under the guidance of the head of the practice, observations are carried out in a medical institution – "MBAL BLAGOEVGRAD",

"Department of imaging diagnostics". The problems related to reducing the radiation of patients during x-ray diagnostics, the radiobiological effects of radiation exposure, as well as the device and principles of operation of modern radiation therapy equipment and radiation protection when working with it are discussed. Modern radiotherapy requires a team approach, with the participation of a radiation therapist, a medical physicist and an X-ray laboratory technician.

Specific goals of the course: The main goal of the course is to give basic knowledge to students regarding the practical implementation of future medical physicists. Students must: build skills for observation and analysis of a specific situation in the process of diagnosis; to familiarize themselves with the requirements and possible approaches when working with patients; to form professional competences regarding behavior in X-ray diagnostics, determining the optimal pace of work, etc.

Pedagogical method: practical exercises and extracurricular work

Prerequisites: Students must have basic knowledge of Atomic and Nuclear Physics, Application of Nuclear Physics in Medicine, Radiation Protection and Dosimetry, etc.

Assessment method: As a form of control, ongoing assessment is provided.

Registration for training in the discipline: not necessary

Registration for the Exam: coordinated with the lecturer and Students Service Department.

EDUCATIONAL PRACTICE IN NATIONAL CENTER FOR RADIOBIOLOGY AND RADIATION PROTECTION AND/OR INSTITUTES OF BAS

ECTS credits: 4.0
Workload per week: 0 Lec. +0 Sem. + 3 Lab.
Evaluation Method: Written exam
Statute of the Subject: Compulsory
Semester: VIII

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Natural Sciences and Mathematics

Subject Description: The course introduces students to the basics of practical methods in physics.
The principles and applications of the basic practices in physics for obtaining, characterizing and studying materials in the field of solid state physics, microwave technology and nanotechnology, laser and nuclear technology are considered. The knowledge is built on the lessons learned from the general basic courses studied in previous semesters of the bachelor's program, considering mainly the most widely used modern physical methods. The multifaceted application of physical knowledge, methods and apparatus for characterization of materials is shown.

Specific Goals of the Subject: The aim of the course is for students to acquire lasting knowledge of the basic principles on which modern tools for obtaining and characterizing materials work. The course demonstrates the direct practical application of the laws of physics in experimental processes and shows the relationship between theory and practice. In this way, the aim is to form a way of thinking that perceives natural phenomena as interconnected and interdependent processes.

Teaching Methods: individual student's work

Requirements/Prerequisites: General knowledge in mathematical methods of physics and analysis

Evaluation Method: Evaluation defined by a written exam and current control of the laboratory exercises taken certain gravity. Some intermediate tests conduct through the semester.

Registration for the course: by request at the end of the current semester.

Registration for the Exam: coordinated with the lecturer and Students Service Department.

EXPERIMENTAL METHODS OF NUCLEAR PHYSICS IN MEDICINE

ECTS credits: 4.0 **Workload per week:** 2 Lec. + 0 Sem. + 2 Lab.
Evaluation Method: Written examination **Statute of the Subject:** Elective
Semester: VII

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Natural Sciences and Mathematics

Subject Description: The course aims to give basic knowledge about the interaction of nuclear radiation with matter, detectors of nuclear radiation and related with them nuclear-physical instrumentation, calibration, primary processing, interpretation of the spectrometric information and others.

Specific Goals of the Subject: The course aims to familiarize students with basic modern methods of nuclear spectroscopy, staging, techniques and primary data processing from nuclear-physical experiments at low energies, as and the acquisition of practical skills for their use

Pedagogical Methods: Lectures, laboratory, home work, tutorials

Preliminary Requirements: Basic knowledge in Atomic and Nuclear Physics and Mathematical Calculus.

Subsidiary Materials: Educational literature on Experimental Nuclear Physics.

Evaluation Method: Written examination. Some intermediate tests conduct through the semester.

Registration for the course: It is necessary to submit a request to Head of the Department at the end of the previous semester.

Registration for the Exam: coordinated with the lecturer and Students Service Department.

Note: The lecture course could be suitable for students of other natural sciences

MEDICAL APPLICATIONS OF PARTICLE ACCELERATORS AND IONIZING RADIATION DETECTORS

ECTS credits: 4.0 **Workload per week:** 2 Lec. +0 Sem. + 2 Lab.
Evaluation Method: Written examination **Statute of the Subject:** Elective
Semester: VII

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Natural Sciences and Mathematics

Subject Description: Some of the diagnostics and medical treatment methods are revised. A special attention is paid to the medical applications of physics technologies. The working principles of different types of particle accelerators are studied. Knowledge for particle interaction with matter is consolidated. The building elements of radiation detectors and signal processing is also studied. The set of practical exercises is meant to provide solid understanding for fundamental physical phenomena, that nowadays nuclear medicine is based to.

Course aims: The course aims to lay down competences and to prepare high quality medical physicists. By the end of course the students are expected to:

1. have acquired an overview of the applications of the accelerators and particle detectors in the medicine;
2. have acquired a comprehensive understanding about the limitations of the different technical solutions;
3. be able to assess the applicability of some technical solutions for solvins specific problems of medical physics.
4. be able to understand the fundamentals and origins of some problems arose during the life of medical physics specialists.

Pedagogical Methods: During the course of lectures the material is introduced to the students successively. Discussions and Q&A sessions are foreseen as well as student thesis argumentation. Graphical materials may be used to facilitate the process of presentation new information. Practical exercises are held in specialized laboratories. During the practical exercises the students will be required to work independently on predefined problems. Before stepping into the problem solving each student is required to discuss the theory and some practical aspects of the problem.

Preliminary Requirements: calculus, linear algebra, atomic and nuclear physics, basics of electronics, basic programming skills

Assessment: ongoing evaluation, practical exam, written exam, discussion

Registration for the course: a written application, addressed to the head of the department by the end of the previous semester.

Registration for the Exam: by prior arrangement with the lecturer

MEASUREMENT OF PHYSICAL QUANTITIES

Semester: VII
Cours Tipe: Lectures and laboratory exercises
Hours per week/FS/SS: 2 lecture hours + 2 laboratory hour per week/FS
ECTS credits: 5 credits

University/Faculty/Department: SWU “Neofit Rilsky”-Blagoevgrad; 66 Ivan Mihailov Blvd./ Natural Sciences & Mathematics/ Mathematics and Physics

Statute of the Subject: Elective

Subject Description: The course “Measurement of Physical Quantities” is included as elective course in the specialty curriculum. It is studied from students studying at educational and qualification degree “Bachelor”. The course “Measurement of Physical Quantities” is with total workload 60 hours, which includes 30 hours lectures and 30 hours laboratory exercises. The students’ self-study is 90 hours. Current control of the students' educational achievements is carried out during the semester in the hours of laboratory exercises. Teaching on the course ends with a written exam.

Course content:

1. Role, place and importance of the measurements in physics.
2. International system of units SI.
3. Precision and errors.
4. Presentation of the results from measurement of physical quantities.
5. Electromechanical devices for measurement of physical quantities.
6. Electronic analog devices for measurement of physical quantities.
7. Electronic digital devices for measurement of physical quantities.
8. Computerized systems for measurement of physical quantities.
9. Methods and tools for measurement electrical physical quantities.
10. Methods and tools for measurement non-electrical physical quantities.

Specific Goals of the Subject: Students to acquire basic knowledge and to form competencies in the discipline "Measurement of Physical Quantities".

Teaching methods and evaluation: Lectures are held in a lecture hall, that is equipped with the necessary technique – computer and multimedia projector, using the computer presentations, which are developed in accordance with the educational content of the lectures.

To conduct the laboratory exercises is used the laboratory “Measurement of Physical Quantities”. The laboratory exercises are conducted in groups. Students work in subgroups of 2–3 persons at workplace and they perform the practical tasks, which are described in the methodological guidelines and discussed in advance with the assistant. After each conducted laboratory exercise students prepare protocol. The laboratory exercise is considered done after submission and defense of the relevant protocol. Certification of the semester get students who have done all laboratory exercises, who have submitted and defended the relevant protocols and who have received an evaluation of the current control at least “Satisfied 3” (D).

Requirements/Prerequisites: Knowledge of General Physics and Mathematics

Evaluation Method: Evaluation defined by a written exam and current control of the laboratory exercises taken certain gravity. Some intermediate tests conduct through the semester.

Registration for the Exam: Coordinated with the lecturer and Students Service Department.

Note: The lecture course is suitable for students of all natural and technical sciences.

PREPARING THE PHYSICAL EXPERIMENT AND PROCESSING OF EXPERIMENTAL DATA

Semester: VII
Cours Tipe: Lectures and laboratory exercises
Hours per week/FS/SS: 2 lecture hours + 2 laboratory hour per week/FS
ECTS credits: 5 credits

University/Faculty/Department: SWU "Neofit Rilsky"-Blagoevgrad; 66 Ivan Mihailov Blvd./ Natural Sciences & Mathematics/ Mathematics and Physics

Statute of the Subject: Elective

Subject Description: The program contains material about the current state of experimental physics, which in turn requires the use of methods of analysis of measurement results. Practical classes consist in the development of programs, realizing basic procedures for data analysis. Examples are concerned with data from specific experiments, but the methods have a much broader scope.

Specific Goals of the Subject: The course aims to equip students with knowledge about the basic methods for the processing of data in order for them to be able to use them in the analysis of specific experiments.

Teaching Methods: lectures, tutorials, individual student's work

Requirements/Prerequisites: General knowledge in mathematical methods of physics and analysis

Evaluation Method: Evaluation defined by a written exam and current control of the laboratory exercises taken certain gravity. Some intermediate tests conduct through the semester.

Registration for the course: by request at the end of the current semester.

Registration for the Exam: coordinated with the lecturer and Students Service Department.

APPLICATION OF ULTRASOUND IN MEDICINE

ECTS credits: 4.0 **Workload per week:** 2 +0 + 2
Evaluation Method: Written examination **Statute of the Subject:** Elective
Semester: VII

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Mathematics and Natural Sciences

Subject Description: The principles and applications of basic diagnostic and therapeutic techniques are considered. The knowledge is built on the lessons learned from the general, basic courses studied in previous semesters of the bachelor's program, and the most widely used modern methods are mainly considered. The multifaceted application of physical knowledge, methods and equipment in medicine is shown. The biophysical bases of the therapeutic action of electromagnetic waves in their impact at the cellular, tissue, organ and systemic levels on living organisms are presented.

Specific Goals of the Subject: The aim of the course is for students to acquire lasting knowledge of the basic principles on which modern medical devices operate, their capabilities for diagnosis and treatment and advantages over traditional means. The course demonstrates the direct practical application of the laws of physics in medicine and biology and shows the relationship between theory and practice. In this way, the aim is to form a way of thinking that perceives natural phenomena as interconnected and interdependent processes.

Teaching Methods: lectures, tutorials, individual student's work

Requirements/Prerequisites: General knowledge in mathematical methods of physics and analysis

Evaluation Method: Evaluation defined by a written exam and current control of the laboratory exercises taken certain gravity. Some intermediate tests conduct through the semester.

Registration for the course: by request at the end of the current semester.

Registration for the Exam: coordinated with the lecturer and Students Service Department.

INTERACTION OF RADIATION WITH THE MATTER

ECTS credits 5.0
Hours per week/ semester: 2 Lec./ 2 Lab.
Evaluation Method: Written examination. Some intermediate tests conduct through the semester.
Status of the Subject: Eligible
Semester: 7

University: SWU "Neofit Rilsky"-Blagoevgrad; 66, Ivan Mihailov Blvd.
Faculty: Natural Sciences & Mathematics
Department: Mathematics and Physics

Annotation: The students acquire basic knowledges about high-energy fluxes (HEFs), such as electron and photon beams and use it for welding, heat treatment, surface modification, fabrication of wear- and corrosion-resistant coatings, etc.

Subject Description: Introduction. Generation of electron and photon beams. Interaction of electronic and photon beams with materials. Nonlinear effects. Heat transfer during processing of materials with lasers. Welding of materials, heat treatment, alloying of metals and alloys with lasers. Plasma production. Biological effects of laser radiation.

Pedagogical Methods: Praxis Assessments A & Written final exam upon the lecture course.

SPECTRAL ANALYSIS IN MEDICINE

Semester: 7 th
Hours (weekly): 2 hours lectures, 1- hours exercise
Course Type: Lectures
ECTS credits: 4.
Department: Chemistry, Faculty of Natural Sciences and Mathematics.
Course status: Optional

Short Description: The curriculum of the course Spectral Methods of Diagnosis includes lectures and laboratory exercises related to basic methods of diagnosis which are characterized by a wide variety of principles and areas of application. The main theoretical bases and practical applications for and the related skills and competencies for practical application are considered.

Course Aims: The main goal of the course is to give the necessary theoretical and practical preparation of students for the possibilities and prospects of the used diagnostic methods, some of which are classic, others more innovative, which allows for the simultaneous application of physical methods in practice.

Teaching Methods: Lectures are illustrated with examples for solving problems related to interpretation of various spectra of complicated samples. For lectures presentation multimedia PC system are used.

Requirements: Knowledge in physics, mathematics, spectroscopy and et…

Registration for the course: A request by students at the end of the previous term

Exam: Test, course work and final written exam

Registration for the exam: Coordination with lecturer and Students Service Department.

BIOCHEMISTRY

ECTS credits: 4,0
Hours per week: 2 Lec. + 0 Sem. + 1 Lab.
Form of assessment: exam
Course Status: Optional
Semester: VII

Methodological guidance:
Department of Chemistry,
Faculty of Mathematics and Natural Sciences

Short Description: The course in biochemistry studies the complex multimolecular organization of living matter, the chemical processes and the main metabolic chains that occur in living organisms. Enzymes, their chemical nature and mechanism of action, as well as biological oxidation, the supply and conversion of energy in the cell are studied.

Course Aims: The course aims to provide students with knowledge of the basic biochemical processes that underlie metabolism, biological oxidation and the associated energy conversion. They gain an understanding of the regulation, control and integration of biochemical processes in organisms. By gaining general knowledge of biochemistry, students understand the studied chemistry material from a general biological perspective.

Teaching Methods: lectures illustrated with diagrams and figures, laboratory exercises, periodic tests.

Requirements/Prerequisites: Basic knowledge of chemistry, physical chemistry, etc. is required.

Registration for the course: by request at the end of the current semester.

Assessment: two tests during the semester and a written exam.

Registration for the exam: coordinated with the lecturer and student Service Department

DANGEROUS ENVIRONMENTAL POLLUTANTS

Semester: 8 th
Hours (per week): 2 hours lectures, hour labs
Course Type: Lectures, labs.
ECTS credits: 4.
Department: Chemistry, Faculty of Natural Sciences and Mathematics.
Course status: Optional

Short Description: The study program of the discipline "Dangerous environmental pollutants" included lectures and exercises considering the chemistry of the basic process and regularities in connection with the environmental contamination and having direct attitude to their preservation.

Course Aims: The aim of the course is to give the student knowledge about the basic factories causing pollution of the nature and the bad results from this. The lab exercises should give students knowledge and skillfulness to carry out analysis.

Teaching Methods: Lectures are illustrated with examples for solving the problems related to contamination and preservation of the environmental and nature. For lectures presentation multimedia PC system are used.

Requirements: Knowledge in inorganic and organic chemistry.

Registration for the course: A request by students at the end of the previous term

Exam: Test, course work and final written exam

Registration for the exam: Coordination with lecturer and Students Service Department.

PROTECTION IN EXTREME CONDITIONS

ECTS credits: 4.0 **Weekly hours**: 0 Lec. + 2 Sem. + 2 Lab.
Form of assessment: exam **Status of the discipline**: elective
Semester: VIII

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Natural Sciences and Mathematics

Annotation: Natural disasters such as earthquakes, fires, floods, hurricanes and others are extremely dangerous to humans, as they occur suddenly, develop rapidly and affect vast areas. In the event of natural disasters, people's normal way of life is severely disrupted, buildings and facilities are destroyed and huge human casualties are caused. In addition to these natural catastrophic processes, severe accidents can occur in power or experimental nuclear reactors, which are accompanied by contamination of the environment with radioactive substances and people can receive doses of radioactive radiation several times higher than the limit values / Chernobyl - 1986, etc./. Moreover, radiation is the most powerful mutagenic and carcinogenic factor for humans. In severe accidents in nuclear reactors, even of medium power, the

consequences for humans and the environment are unpredictable. Terrorist attacks have also shown that every country in the world can be the target of mass terrorism. In these cases, there is a particularly great danger to people's lives in places where a larger number of people are concentrated. The goals and objectives of the course are for students to acquire knowledge of the basic principles of proper action in earthquakes, fires, floods, hurricanes and more. The main ways and means for organizing and conducting rescue operations in the areas of destruction. Methods and means for providing first aid to injured people, etc.

Course content:
Topic 1. Basic principles for correct actions of people in the event of earthquakes.
Topic 2. Ways and means for organizing and conducting rescue operations in areas of strong and catastrophic earthquakes. Manual and mechanized methods and tools.
Topic 3. Basic methods and tools for providing first aid to people in earthquakes.
Topic 4. Ways and means to protect people from floods.
Topic 5. Methods and means for protection of people in case of hurricanes.
Topic 6. Protection of people in the event of blizzards, avalanches, etc.
Topic 7. Occurrence of fires. Toxic substances formed during fires.
Topic 8. Ways and means to protect and rescue people from burning buildings.
Topic 9. Methods and tools for first aid to people from burns and thermal shock.
Topic 10. Ways and means for extinguishing fires.
Topic 11. Protection of people in the event of major accidents and contamination with toxic substances.
Topic 12. .Methods and means for protection of people in case of severe accidents at the NPP.
Topic 13. Ways and means for protection and decontamination of food and water in case of contamination with radioactive substances.
Topic 14. Basic principles for correct actions in the event of terrorist attacks.

Training and assessment technology: a) For classroom employment: The main methods used for teaching students are discussion talks using video system and computer configuration, practical demonstrations with technical means of various methods and means of protecting people from natural disasters, severe accidents, rendering first aid to the injured, etc.
b) For extracurricular activities: To expand the knowledge of the discipline, students at their request prepare papers, using the information array of libraries, solve test tasks on a given topic, practice with technical means of first aid, prepare hand tools for protection and OPP, the best participate in competitions at regional and national level for first aid, etc.

CONDENSED MATTER PHYSICS

ECTS credits: 4,0
Weekly workload: 3 Lec. + 0 Sem. + 1 Lab.
Form of assessment: Written exam
Statute of the course: elective
Semester: VIII

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Natural Sciences and Mathematics

Annotation: The course "Condensed Matter Physics" is included as compulsory course in the specialty curriculum "Medical Physics". It is studied from students studying at educational and qualification degree "Bachelor".

The course "Condensed Matter Physics" is with total workload 60 hours, which includes 45 hours lectures and 15 hours laboratory exercises. The students' self-study is 120 hours.

Current control of the students' educational achievements is carried out during the semester in the hours of laboratory exercises.

Teaching on the course ends with a written exam.

Course content:

1. Model of condensed matter. Main types condensed matter.
2. Chemical bonds. Types. Energy of chemical bond.
3. Geometric properties of the crystal lattice.
4. Defects in the crystal lattices.
5. Condition of electrons in atoms with many electrons and in the crystal.
6. Elastic properties of condensed matter.
7. Magnetic properties of condensed matter.
8. Dielectric properties of condensed matter.
9. Macroscopic polarization of solid states.
10. Optical properties of condensed matter.
11. Superconducting properties of condensed matter.

Teaching methods and evaluation: Lectures are held in a lecture hall, that is equipped with the necessary technique – computer and multimedia projector, using the computer presentations, which are developed in accordance with the educational content of the lectures.

To conduct the laboratory exercises is used the laboratory "Condensed Matter Physics". The laboratory exercises are conducted in groups. Students work in subgroups of 2–3 persons at workplace and they perform the practical tasks, which are described in the methodological guidelines and discussed in advance with the assistant. After each conducted laboratory exercise students prepare protocol. The laboratory exercise is considered done after submission and defense of the relevant protocol. Certification of the semester get students who have done all laboratory exercises, who have submitted and defended the relevant protocols and who have received an evaluation of the current control at least "Satisfied 3" (D).

Teaching on the course "Condensed Matter Physics" ends with a written exam on the educational content. A final evaluation is formed only if the student has received an evaluation of the written exam at least "Satisfied 3" (D). In forming of the final evaluation are reported the evaluations from the written exam (40 %) and from the current control (60 %).

ENVIRONMENTAL PHYSICS

Semester: 8 semester
Cours Tipe: Lectures and laboratory exercises
Hours per week/FS/SS: 2 lecture hours, 2 laboratory/FS
ECTS credits: 4.0 credits
University/Faculty/Department: SWU "Neofit Rilsky" - Blagoevgrad; 66 Ivan Mihailov Blvd./ Natural Sciences & Mathematics/ Mathematics and Physics

Status of the Subject: Elective course

Subject Description: The course includes studying of the basic physical phenomena in the environment, including the Distribution and properties of the water, structure and energy balance of the atmosphere, heat, electromagnetic, noise and aerosol-pollutions.

Course aims: The students in physics have to receive ground knowledge about using the contemporary physical Methods in the monitoring of the environment.
Pedagogical Methods: Lectures, laboratory, homework, tutorials.

Preliminary Requirements: Basic knowledge in General Physics – parts mechanics, molecular physics, thermodynamics and electricity.

Assessment: Written examination. Some intermediate tests conduct through the semester.

Registration for the course: by request at the end of the current semester.

Registration for the Exam: coordinated with the lecturer and Students Service Department.

Note: The lecture course could be suitable for students of other natural sciences

ELECTROMAGNETIC POLLUTION

ECTS credits: 4,0
Weekly workload: 2 Lec. + 1 Sem. + 1 Lab.
Form of assessment: Written exam
Statute of the course: elective
Semester: VIII

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Natural Sciences and Mathematics

Subject Description: The program contains materials on the main electromagnetic radiation, the important quantitative relationships between quantities and generally accepted models to explain the more important phenomena in the field of electromagnetism.
The practical classes consist in acquainting students with the basic processes in electromagnetic radiation and experimental methods for its measurement, its impact on biological objects and its damage.

Specific Goals of the Subject: The aim of the course is for students to acquire knowledge of basic concepts in the field of electromagnetic radiation and pollution and methods for reducing the harmful effects of electromagnetic waves. The results of the overall acquisition of knowledge are manifested further in the learning process.

Teaching Methods: lectures, tutorials, individual student's work

Requirements/Prerequisites: General knowledge in mathematical methods of physics and analysis

Evaluation Method: Evaluation defined by a written exam and current control of the laboratory exercises taken certain gravity. Some intermediate tests conduct through the semester.

Registration for the course: by request at the end of the current semester.

Registration for the Exam: coordinated with the lecturer and Students Service Department.

MICROPROCESSORS AND MICROCONTROLLERS

ECTS credits: 4,0
Hours per week: 2 Lec. + 0 Sem. + 2 Lab.
Form of assessment: exam
Course Status: elective
Semester: VIII

Methodological guidance:

Department of Electrical Engineering, Electronics and Automation,
Faculty of Engineering

Short Description: The subject "Microprocessors and Microcontrollers" is part of the curriculum and includes 10 general topics. The proposed course studies the types, characteristics, functioning, organization and use of microprocessors and microcontrollers. The program model of various processors, types of addressing and instructions, peripheral modules, organization of microprocessor systems, internal circuit interfaces and interfaces between individual microprocessor systems are examined. Part of the lecture material concerns the problems of designing, setting up and testing microcontrollers..

Course Aims: The goal of the course is for students to know the basic principles of operation and organization of microprocessors/microcontrollers, to study and work with various integrated software development environments for them, to program them with high- and low-level languages, and to test and tune them.

Teaching Methods: lectures, exercises and extracurricular work

Requirements/Prerequisites: The discipline is related to the following disciplines: Computer Fundamentals, Informatics.

Assessment: As a form of control, ongoing control and an exam are provided.

Registration for the course: by request at the end of the current semester.

Registration for the exam: Students and the lecturer agree on the convenient dates within the announced calendar schedule of examination session.

HEALTHCARE MANAGEMENT

ECTS credits: 4,0
Hours per week: 2 л+ 1 су + 0 лу
Form of assessment: Written exam
Course Status: elective
Semester: VIII

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Mathematics and Natural Sciences
Short Description: The course introduces students to the essence of management activities, the main management functions, planning, organizing, implementing and motivating and controlling. The emphasis is on the complex of factors that play a significant role in the selection of management tools in the entire system and in individual health institutions and the types of activities in them.

Course Aims: The course aims to introduce students to the place and role of management in healthcare in various healthcare organizations, the main approaches and methods of management, as well as global trends, experience and achievements of leading management practices. To provide students with basic knowledge of healthcare management, to familiarize themselves with the conceptual framework and specifics of management principles, approaches, management technologies and good practices in the field of healthcare.

Teaching Methods: lectures, exercises and extracurricular work

Assessment: As a form of control, ongoing control and an exam are provided.

Registration for the course: by request at the end of the current semester.

Registration for the exam: Students and the lecturer agree on the convenient dates within the announced calendar schedule of examination session.

DOPING AND CONTROL

ECTS credits: 4,0
Weekly workload: 2 Lec. + 0 Sem. + 1 Lab.
Form of assessment: Written exam
Statute of the course: elective
Semester: VIII

University / Faculty / Department: SWU "Neofit Rilski", Blagoevgrad, 66 Ivan Mihaylov str., Faculty of Mathematics and Natural Sciences, Department of Chemistry

Description: The curriculum for the Doping and Control course includes lectures and laboratory exercises related to: the list of substances prohibited by WADA, chemical structures and their relationship to biological activity, sampling, analysis and detection of prohibited substances, therapeutic use exceptions. The main methods of sample processing and analysis, the different classes of used substances, the mechanism of action and the consequences of misuse are discussed.

Aim: The aim of the course is to be acquired systematic knowledge and skills to identify and characterize the compounds used for doping, the benefit of their therapeutic use and the consequences of misuse. It is essential for students to be aware about the different doping substances and the how harmful they could be with an accent to their usage by sports and fitness enthusiasts.

Teaching methods: Lectures and laboratory exercises.

Requirements: Basic knowledge of organic chemistry, analytical chemistry and chromatographic analytical methods. Recording for the course: it is necessary.

Assessment: Two control tests (C1, C2) and a written final exam Final score = 0.4 (C1 + C2) / 2 + 0.8 Exam.

Entry for the exam: After approval by the lecturer and the teaching department.

ECOLOGY

ECTS credits: 4.0
Workload per week: 2 Lec. + 0 Sem. + 2 Lab.
Evaluation Method: Written examination
Statute of the Subject: Elective
Semester: VIII

Methodological guidance:
Department of Mathematics and Physics,
Faculty of Natural Sciences and Mathematics

Short Description: The course "Ecology" focuses on basic concepts, approaches and concepts in ecology as an interdisciplinary science that combines biological, physical and social sciences and is closely related to environmental protection.

During the training students get acquainted with the object, subject, tasks and research methods in ecology, with the main environmental factors - abiotic, biotic and anthropogenic; with the concept of the limiting action of environmental factors and the adaptations of organisms to them; with the composition, structure, development and productivity of biological macrosystems - populations, biocenoses, ecosystems; with the cycle of substances and the flow of energy in ecosystems; with the essence and organization of the biosphere, with the concept of the ecosphere.

Course Aims: Students to gain basic knowledge of the use of modern physical methods for monitoring and control of the environment.

Requirements: Basic knowledge of the courses in General Physics - Mechanics, Molecular Physics, Thermodynamics and Electromagnetism.

Registration for the course: by request at the end of the current semester.

Registration for the Exam: coordinated with the lecturer and Students Service Department.

Note: The lecture course could be suitable for students of other natural sciences