SPECIALITY : **PHYSICS**
MASTER PROGRAMME: **CONTEMPORARY ENERGY SOURCES AND ENVIRONMENT PRESERVATION**
EDUCATIONAL QUALIFICATION DEGREE: **MASTER**
PROFESSIONAL QUALIFICATION : **MASTER IN PHYSICS**
DURATION : **4 SEMESTERS**
FORM : **REGULAR**

QUALIFICATIONAL CHARACTERISTIC

The master program "Contemporary energy sources and environment preservation" with duration of 4 semesters is appropriate for students graduated from other bachelor programs that give good mathematics preparations as in mathematics, informatics, chemistry, computer systems and technologies and other engineering specialities. The qualificational characteristics defines the professional profile and realization of specialist with educational-qualificational degree "master" of physics, as well as the requirements towards the students during their preparation.

The curriculum of the master program was developed in line with state educational requirements and European educational norms and trends. It consists of obligatory, optional and elective disciplines that dive theoretical and applied knowledge in modern areas of physics and its application in other sciences, and in production.

SPECIALIST PROFILE

The master program in "Contemporary energy sources and environment preservation" prepares for work in environmental laboratories, epidemiological inspection, environment monitoring stations, companies that use alternative energy resources, research institutions (in relation to physics, chemistry, biology, geology) that use physical methods of environment monitoring and control. The master degree allows the graduates to be employed as specialists in research organizations, physicist, designers of solar installations, chief of laboratory, researcher, assistant professor and lecturer in higher schools after an admission examination.

REQUIREMENTS TOWARD SPECIALIST PREPARATION

Following "Contemporary energy sources and environment preservation" master program the students acquire fundamental and specialized knowledge in the area of physical problems of environments, ecology, cosmic physics, biophysics, alternative energy resources, photoelectronics, biophysical methods of environmental control, radioecology, solar energy, etc. During their studies the students acquire also theoretical and applied knowledge and skills in microprocessors, computer architecture, computer modeling and WEB design, communication and information technologies.

The students should have skills that allow them to work in laboratories for complex environmental monitoring.

CURRICULUM

First year			
First semester	ECTS (credits)	Second semester	ECTS (credits)
Applied mathematics	12	Molecular physics	6
Mathematical methods of physics	6	Optics	6
Mechanics	6	Atomic and nuclear physics	6
Electricity and magnetism	6	Astrophysics	6
		Theoretical physics	6
	Total 30		Total 30
Second year			
Third semester	ECTS (credits)	Fourth semester	ECTS (credits)
Physical methods in environmental research	6	Ecological expertises	5
Chemical methods in environmental research	6	Elective discipline group II	5
Elective discipline group I		Elective discipline group II	5
Elective discipline group I	6	State graduation examination in physics or	
Elective discipline group I	6	Diploma theses	15
	6		
Elective disciplines group I		**Elective disciplines group II**	
Modern computer techolnogies		Modern methods in aerocosmic and environmental research	
Visual programming		Photovolatic conversion of solar energy	
Applied informatics		Laser methods in environmental research	
Specialised foreign language preparation		Energy production and ecological problems	
Passive solar systems (Solar architecture)		Philosophical problems of physics	
Applied biophysics			
	Total 30		Total 30

TOTAL FOR TWO YEARS: 120 CREDITS

COURSES DESCRIPTION

Applied Mathematics

Course Title: Applied Mathematics
Semester: 1 semester
Course Type: lectures, tutorials and lab exercises
Hours per Week/FS/SS: 3 lecture hours, 2 tutorial hours and 2 lab hours per week/FS
ECTS Credits: 12 credits
Department: Informatics
Course Status: Compulsory Course in the M.S. Curriculum of Energetics and Environment Protection
Course Description: The course includes:

- basic **numerical methods** of Mathematical Analysis (approximation of functions by interpolation and the least suqres data fitting, numerical differentiation, numerical quadrature), of Algebra (solving nonlinear equations and systems of linear equations) and of Ordinary Differential equations (Cauchy problem for ordinary differential equations of I order and boundary problem for ordinary differential equations of order II);
- basic concepts and results of combinatorics and **Theory of Probability** (random events, probability, random variables, probability distributions, basic characteristics of random variables, basic results of theory of probability).

Course Objectives: Students should obtain basic knowledge about numerical methods and theory of probability and mathematical statistics.
Teaching Methods: lectures, tutorials and lab exercises
Requirements/Prerequisites: Mathematical Analysis, Linear Algebra, Analytic Geometry, Differential Equations.
Assessment: written final exam covering problems /omitted in case the average grade of two current problem tests is higher than Very Good 4.50/ (grade weight is 30 %) and theory on two topics (grade weight is 30 %); two homework (grade weight is 20 %) and two projects (grade weight is 20 %)
Registration for the course: not necessary
Registration for the exam: coordinated with the lecturer and Student Service Department

References:

I. Basic titles:

1. B. Sendov, V. Popov – "Numerical Methods", Part I, St. Kliment Ohridski Sofia University Press, Sofia, 1996.
2. B. Boyanov – "Lectures on Numerical Methods", Sofia, 1995.
3. "Numerical Methods Problem Book", 2-nd ed., St. Kliment Ohridski Sofia University Press, Sofia, 1994.
4. M. Kaschiev – "Numerical Methods Handbook", Martilen, Sofia, 1994.
5. D. Bainov – „Theory of Probability and Mathematical Statistics", Impulse-M, Sofia, 1990.
6. B. Dimitrov, N. Yanev – "Probability and Statistics", Sofia, 1990.
7. B. Dimitrov, E. Karashtranova – "Statistics for Non-mathematicians", Blagoevgrad, 1993.
8. K. Kalinov – "Theory of Probability", Sofia, 2002.

II. Additional titles:

1. S.M. Stefanov – "Numerical Analysis", MS4004-2203, Limerick, 1998.
2. W. Feller – "Theory of Probability", Nauka and Izkustvo, Sofia, 1985 (in Bulgarian).

Abbreviation:
FS: Fall Semester
SS: Spring Semester

Mathematical Methods in Physics

ECTS credits: 6.0 **Hours per week:** 2 Lectures + 1 Seminar
Assessment: exam **Course Status:** Obligatory course in Physics M.S. Curriculum
Semester: I

Department of Physics
Faculty: Natural Sciences & Mathematics

Specific Goals of the Course: the course aims at introducing some of the aspects of the theory of partial differential equations and the basis of vector and tensor analysis. The course focuses on physical aspect of basic mathematical notions and methods for the solving of important types of problems in order to clarify the possibility to practically apply the knowledge acquired in the course.

Short Description: Main topics to be considered:

- First degree partial differential equations
- Linear second degree partial differential equations from hyperbolic, parabolic and elliptic kind
- Wave equation, heat equation, Laplac's and Poisson's equations
- Vector and Tensor Analysis

Pedagogical Methods and Assessment:
The course includes lectures, seminars, consultations, course assignments and tests. Evaluation is made on the basis of term and final tests based on the contents of the lectures and the seminars. Only students who have positive evaluation mark on the term tests are allowed to take the final test. The students with high term evaluation marks varying between 5.00 and 5.50 only have to take theoretical exam, those who have term evaluation mark between 5.50 - 6.00 do not have to take the final exam and are given an excellent final mark for the course. The course grade (CG) is only assigned to students who have passed successfully and with a positive marks both their term and final tests. The final course grade is calculated with the help of the following formula:

CG = 0.6 X Term test results + 0.4 X Final test result

Mechanics

Title Mechanics	No 3	**Semester** I
Type of presentation Lectures/ Seminars/Laboratory classes	**Hours per week)/ semester** 2 Lec./ 1 Lab.	**ECTS credits** 6

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

Status of the Subject: Compulsory

Subject Description:

The course considers classical mechanics phenomena. It starts with kinematics and dynamics of point particle and system of point particles. The Newtonian principles of dynamics are considered in details. Particular attention is paid to motion in inertial and noninertial frames of reference, laws of conservation of energy and momentum, gravitation, such phenomena as mechanics harmonic oscillatory motions and waves. In addition the basic principles of the special theory of relatively and fluids mechanics are present.

Specific Goals of the Subject:
The university course "Mechanics" is aimed to ensure basic knowledge on mechanics phenomena as a foundation of the physics. Receiving this grounding the students are getting ready for others special courses studying during the next years. Laboratory classes give the students practical skills for physics observations.

Pedagogical Methods: Lectures are visualized by demonstrations. During the seminar classes students solve varied problems on optics. Parts of topics with practical importance are directed to the laboratory classes.

Preliminary Requirements: Basic knowledge in Physics and Mathematics.

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

Evaluation Method: Written examination and additional conversation with the lecturer upon course topics. Some intermediate tests conduct through the semester.

Inscribing for tuition: Not necessary.

Inscribing for exam: Agreement with the lecturer.

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

Electricity and Magnetism

Title **Electricity and Magnetism**	No 4	Semester **I**
Type of presentation Lectures/ Seminars/Laboratory classes	**Hours per week** 2 Lec/ 1 Lab	ECTS credits 6

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

Status of the Subject: Compulsory

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 concern questions of movement of the electrical parts in electric and magnetic fields.

Specific Goals of the Subject: Students acquire knowledge about Electromagnetism, Optics, Quantum Mechanics, Modern Atomic and Nuclear Physics. Material is selected depending of the specificity of the speciality. For that reason some specific topics are presented in details. Parts of topics with practical importance are directed to the laboratory classes.

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.

Preliminary Requirements: Basic knowledge in Physics and Mathematics.

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 and subsequent conversation with the lecturer. Some intermediate tests conduct through the semester.

Inscribing for tuition: Not necessary.

Inscribing for exam: Agreement with the lecturer.

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

Molecular physics

Title Molecular physics	**№** **5**	**Semester** **II**
Type of presatotion Lectures/Laboratory	**Hours (per week)/ semester** 2 L/ 1 Lab/ winter	***ECTS credit*** 6

University/Faculty/Department: SWU "Neofit Rilski"-Blagoewgrad; 66, Ivan Mihailov Blvd/ Natural Sciences&Mathematics/ Department of Physics.
Status of the Subject: compulsory
Subject Description: The course is basic in the physical education and has two parts in the general physics – thermodynamics and molecular physics. They continues one semester and ends with an examination. The course combines the fondation of the reversible thermodynamics, statistical and thermodynamical treatment of its basic values, surface tension, viscosity difusion, physical acustics and elements of nonreversible thermodynamics.
Specific Goals of the Subject: The course gives to the students minimal knowledge required about the basic macroscopic physical phenomena in the region of the thermodynamics and molecular physics. The pracrical appliation of the knowledges is the object of treatment in the seminars and laboratory.
Pedagogical Methods: Lectures visualised by phsical demonstrations, seminars with decision of physical problems, laboratory classes. Some of the lectures are in a multimedia form.
Preliniuary Requirements: Basic Knowledge in mathematical analysis.
Subsidiary Materials: Educational literature on general physics (parts molecular physics and thermodinamics), printed materials on the sometopics, given wy the lectures to the sudents.
Evaluation Methods: Every part ends with written and oral examination. The results from the test examination during lectures, seminars and laboratory take place in the full evaluation.
Inscribing for tuition: Not necessary.
Inscribing for exam: Agreement with the lecturer .
Note: The lecture cuorse is convenient for Students of Physical, Chemistry and other natural and technical sciences.

Optics

Title **Optics**	No 6	Semester II
Type of presentation Lectures/ Seminars/Laboratory classes	**Hours per week)/ semester** 2 Lec./ 1 Lab.	ECTS credits 6

University/Faculty/Department: SWU "Neofit Rilsky"-Blagoevgrad; 66, Ivan Mihailov Blvd./ Natural Sciences & Mathematics/ Physics
Status of the Subject: Compulsory
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**.**

Specific Goals of the Subject: Students acquire knowledge about general phenomena and laws of light wave propagation. The course gives a base for others special courses such as Quantum electronics and Optical communication.

Pedagogical Methods: Lectures are visualized by demonstrations. During the seminar classes students solve varied problems on optics. Parts of topics with practical importance are directed to the laboratory classes.

Preliminary Requirements: Basic knowledge in Physics and Mathematics.

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

Evaluation Method: Written examination and additional conversation with the lecturer upon course topics. Some intermediate tests conduct through the semester.

Inscribing for tuition: Not necessary.

Inscribing for exam: Agreement with the lecturer.

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

Atomic and Nuclear Physics

Course Title: Atomic and Nuclear Physics
Semester: II
Type of presentation: Lectures / Laboratory classes
Hours per week / AS / SS: 2 Lecture hours / 1 Laboratory hour / SS
ECTS credits: 6
Department: Physics Department
Course Status: Compulsory course in the Physics M.Sc. Curriculum.

Short Description: Introduction to Atomic and Molecular Physics. Structure and Models of the Atom. Hydrogen Atom. Interaction of Atoms with Electromagnetic Radiation, External Electric and Magnetic Fields. Zeeman Effect. Intermolecular Interactions. Basic concepts of Nuclear Physics. Nuclear structure. Nuclear Forces. Isotopic Spin. Parity Violation, Neutron-Proton diagrams. Radiation α, β and γ. Nuclear models. Nuclear reactions. Neutron Physics. Fission. Fusion. Nuclear reactors. Basic concepts of Radiation Safety. Elementary particles.
Course Aims: The students acquire basic knowledges required about Atomic and Nuclear 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.
Teaching Methods: Lectures are visualised by demonstrations and laboratory tasks performance during the laboratory classes. Exercises and case studies are decided at seminars. From methods point of view teaching material is grouped in sections by logical consistency from Structure of Atoms and Atomic and Nuclear Models to Nuclear Physics. Practical topics are directed to the laboratory classes.

Requirements / Prerequisites: Basic knowledge in General Physics and Mathematics.

Evaluation Method: Defence of the Labs Protocols L; Two intermediate tests K_1 and K_2 conduct through the semester; Written final exam upon the lecture course.

Rating: = 0,2.L + 0,2.$\left(\frac{K_1 + K_2}{2}\right)$ + 0,6 (Exam)

Inscribing for tuition: Not necessary.
Inscribing for exam: Agreement with the lecturer and the Students Service Department

References:

1. Gramatikov P. S. *Atomic Physics*, N. Rilski Univ. Press, Blagoevgrad, 2007 (in Bulgarian).
2. Gramatikov P. S. *Nuclear Physics with elements of radiation protection and dosimetry*, N. Rilski Univ. Press, Blagoevgrad, 2008 (in Bulgarian).
3. Mandjukov I. *Experimental Nuclear Physics*, Sofia Univ-PhusFac., 2002
4. Balabanov N., M. Mitrikov. *Atomic Physics,* Sofia University Press "Kliment Ohridski", Sofia, 1991 (in Bulgarian)
5. Balabanov N. *Nuclear Physics*, Plovdiv Univ.Press, Plovdiv, 1998 (in Bulgarian)
6. A. Detlaf, B. Yavorskiy. *Course on Physics*, High School, Moscow, 1989 (in Russian)

Asrtophysics

ECTS credits: 6 credits **Hours per week: 2 lecture hours, 1 seminar hours**
Assissment method: Examination **Course Status:** Compulsory subject
Semester: II
Methodical leadership:
Department of Physics
Faculty of Natural Sciences &Mathematics

Annotation:

The course "Astrophysics" has the task to acquaint the students with the basic methods and results in the nowadays astrophysics and gamma-astronomy of the ultra high energies and space physics. This is a new branch of the science, developed on the boundary between astronomy, cosmic rays physics and high and ultra high energy physics. Large scale detector complexes constructed on the base of scintillation, gas filled and cerenkov detectors, connected with complex logic and registering the data in real time are used.

A particular attention to the methods of mathematical modeling of electron-photon and photon-nuclear cascades and extensive air showers which are the main information carrier is given. The requested parameters and characteristics of the primary flux are estimated by solving complex inverse tasks with the help of modern mathematical methods.

The energy spectrum and the nuclear composition of the primary cosmic rays flux and its connection with the structure of the Universe and the processes going in it are analyzed.

A number of active astrophysical objects as local sources of primary gamma quanta, their photon spectrum and possible models, explaining the intensity and the time dependencies of the registered fluxes are examined.

As a whole the course "Astrophysics" should give the students a concept for the experimental technique and mathematical methods used in the present-days high-technology astrophysical complexes, to acquaint them with the actual problems and connections between the processes in the micro and macro space and with the modern ideas about the structure of the Universe ant the processes in it.

Course contents:
Lectures
Origin of the modern astrophysics and high energy gamma astronomy. Universe, structure and basic processes in it.
Final stages in the evolution of stars.
Elementary interactions.
Strong interactions.
Electromagnetic cascade theory.
Nuclear cascade process.
Mathematical modeling of EAS.
Nuclear composition of primary cosmic rays flux.
Energy spectrum of primary cosmic rays flux.
EAS initiated by primary gamma quanta.
Cherenkov gamma telescopes.
Gamma quanta from compact extragalactic sources.

Teaching Methods and Assessment:

Two homeworks (marks D1, D2) and two written tests (marks K1, K2) are rated for continuous assessment during the semester. Only students with average rating from the continuous assessment greater than 3 are allowed to go on a examination.

The mark at the terminal examination (Exam) has the main weight in the final rating.

$$\textbf{Rating} = 0{,}05 \cdot \left(\frac{D1+D2}{2}\right) + 0{,}15 \cdot \left(\frac{K1+K2}{2}\right) + 0{,}8\ (Exam)$$

Registration for the Course: by request at the end of the current semester (when is not obligatory course).

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

Final grade calculation is done by using a 6-point rating scale: the rating 6 equals level A on ECTS; the rating 5 equals level B on ECTS; the rating 4 equals level C on ECTS; the rating 3 equals level D on ECTS; the rating 2 equals level E on ECTS.

REFERENCES:

1. Мурзин, **Введение в физику космических лучей**, Москва, Атомиздат 1979.
2. Hayakawa, **Cosmic Ray Physics**, New York, Interscience, 1969.
3. Hillas, A. M. **Cosmic Rays**, Oxford, Pergamont Press, 1982
4. Grieder P. , **Cosmic Rays At Earth - Researcher's Ref Manual And Data Book**, Elsevier, Amsterdam 2001
5. Dorman L. I., **Cosmic Rays in the Earth's Atmosphere and Underground**, Kluwer Academic Publishers, The Netherlands, 2004
6. Longair, M. S. **High Energy Astrophysics**, Cambridge Univercity Press, 2011

Theoretical physics

Course Title: " Theoretical physics"
Semester: 2 semester
Cours Tipe: Lectures and tutorials
Hours per week/FS/SS: 2 lecture hours, 1 tutorial hours per week/SS
ECTS credits: 6 credits
Department: Department of Physics

Course Status: Obligatory course in the B.S. Curriculum of physics
Short Description:

The course deals with standard material of theoretical physics from the following areas: mechanics, electrodynamics, quantum mechanics, statistical physics and thermodynamics but adapted to students with a serious mathematical background who have not graduated a bachelor course in physics.

Course Aims: The course aims at giving fundamentals knowledge in theoretical Physics and to serve as a foundation for courses in theoretical physics, quantum electronics, astrophysics and other special courses.
Teaching Methods: lectures, tutorials, individual student's work
Requirements/Prerequisites: General knowledge in mathematical Analysis
Assessment Current evaluation at seminars and final written examination with discussion upon the end of the course.
Registration for the Course: by request at the end of the current semester (when is not obligatory course).
Registration for the Exam: coordinated with the lecturer and Students Service Department
References:

Basic

1.Д.Трифонов, Класическа електродинамика, Изд-во ЮЗУ, Благоевград, 1995.
2.Х.Попов, Електродинамика, "Наука и изкуство", София, 1987.
3.А.Атанасов, Основи на квантовата механика, Изд.Пловдивски У-тет, 1993.
4.С.Иванов, Основи на теоретичната и квантова механика, Изд. Софийски У-тет, 1998
5.И.Златев, А.Николов, Теоретична механика Наука и изкуство, София, 1985..
6.Ч.Кител, Х.Кремер, Статистическа термодинамика**, "**Наука и Изкуство София, 1988

Additional

11.Л.Ландау, Е.Лившиц, Електродинамика, Механика, Квантовая механика, "Наука", Москва, 1976.

Physical Methods in Environmental Research

ECTS credits: 6 credits **Hours per week: 2 lecture hours, 2 laboratory hours**
Assissment method: Examination Course Status: Obligatory

Semester: III

Methodical leadership:
Department of Physics
Faculty of Natural Sciences &Mathematics

Annotation:
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. The students in physics have to receive ground knowledge about using the contemporary physical methods in the monitoring of the environment.

Course contents:
Modern physical problems in the protection and control of environmental parameters.
Distribution and properties of water on the globe, and in living organisms. Water balance in the hydrosphere.
Anomalies in the physical properties of water and their importance for the energy balance of the earth and the development of living organisms.

Structure of water - models. Spectral properties of different ranges. Spectrum of the energy distribution of the intermolecular bonds in water and method for obtaining it.
Ionization of water - pH and pK. Water as a solvent. Acid rains and their neutralization.
Physical methods for activation of water. Activation of water by turbulent motion, motion in a gradient magnetic field and by electrolysis through a membrane filter.
Aerosols and pollutions on atmosphere. Physical properties and methods of studying aerosols
Atmospheric Optics. Basic optical phenomena and methods for their study. Optical absorption and scattering. Lidar systems.
Spectrum of solar radiation. Laws of thermal radiation. Photovoltaic inverters on solar energy. Water and wind sources of energy. Bioenergy.
Anthropogeneous sources of energy. Heat sources on based of natural fuels. Nuclear sources. Hydrogen Energy.
Transport of pollutions in the atmosphere and hydrosphere. Diffusion, hydrodynamic transmission turbulence.
Spectroscopy of the environment. Atomic, molecular, Raman spectroscopy and X-ray. Global approach for monitoring on pollutions of the upper atmosphere by artificial satellites on Earth.
Radioactive contaminations of the environment. Radiation monitoring of the atmosphere, earth, water sources and biological species.
Noise pollution of the environment. Sound level, monitoring, problems for the noise insulation.
Impact of noise on the human psyche. Psycho-physical mechanism of sound pollution.

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.

The students' extra-curriculum activity represents the preparation and presentation of a scientific experimental research; conducting physical studies; testing

Help Materials:

1. E.Bocker, R.Van Gondelle, Enviromental Phisics, John Wiley and Sons, N.Y., 1996.
2. Д.Митчел, Д.Смит, Аквametрия, Химия, Москва, 1986.
3. А.Хргиан, Физика атмосферы, Изд. Московского у-та, Москва, 1986.
4. А.Грицков, Фотометрия, Спектрофотометрия, Колориметрия, изд.СУ, София,2000.
5. Г. Василев, Химия и опазване на околната среда, УИ „Св. Климент Охридски", София, 2007.

Assessment:

The **assessment** of the students' results is done accordingly to the ECTS. The final rating is formed at the end of the course on the basis of the rating of a written test on all topics mentioned above, on the basis of the rating of the student's routine control and on the basis of the rating of the student's extra-curriculum activity in the following ratio.

Chemical Methods for Environmental Investigations

Course Title: Chemical Methods for Environmental Investigations
Semester: III
Course Type: Lectures and tutorials
Hours per week/FS/SS: 2 lecture hours, 2 tutorial hour per week/SS
ECTS Credits: 6

Department: Department of Chemistry, telephone: 88-53-81, e-mail: himia@aix.swu.bg

Course Status: Obligatory course in the Master program in physics

Short Description: Topics of the course: Main steps in analytical procedures using instrumental analytical methods, relative and absolute methods, calibration, and basic metrological characteristics of the instrumental analytical methods. In a systematic way are introduced most common spectral, magneto-chemical and chromatographic methods for analysis.

Course Aims: Students should obtain basic knowledge and practical skills in most commonly used instrumental methods for analysis of composition of the various objects. Physical basis, advantages and limitations of the studied analytical methods are also presented.

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

Requirements/Prerequisites: Standard requirements for attendance of the Master program "Physics"

Assessment: laboratory tutorial mark L; final test T and exam E

Rating: = 0.2 x [**L**] + 0.5 x [**T**] + 0.3 x [**E**]

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

References:

1. *Analytical Chemistry*. Editors: R. Kellner, J.-M. Mermet, M. Otto, H. Widmar, WILEY-VCH, Venheim.
2. Г. Крисчън, Дж. О'Рейли. *Инструментален анализ*. Унив. Изд. "Св. Кл. Охридски", София, 1998.
3. D. Harvey. *Modern Analytical Chemistry.* Mc Graw-Hill Higher Education, 2000.
4. А. Хайнц, Г. Райнхард. *Химия и околна среда.* Унив. Изд. "Св. Кл. Охридски", София, 2000.
5. И. Тинсли. *Поведение химических загрязнителей в окружающей среде.* Мир, Москва, 1982.
6. Werner Stumm, Ed. *Global Chemical Cycles and Their Alterations by Man*. Dahlem Konferenzen, Berlin, 1976.
7. C. Goldman, A. Horne. *Limnology*. McGraw-Hill, New York, 1983.

Modern Computer Technologies

Subject **Modern Computer Technologies**	**No 3**	**Semester** **3 semester**
Type of lecture Lectures/Seminars	**Hours (Week) / semester** 2 L / 2S / Winter semester	**Credits** 6.0

University/Faculty/Department: SWU "Neofit Rilski", Blagoevgrad, Ivan Michailov 66/ Mathematics & Natural Science Faculty "Computer systems and technologies"

Status of the Subject: Optionally Subject

Description of Subject:

- Main conception of modern computer technolgies.
- Architecture and basic components of computers.
- Modern technologies in microprocesor and memory equipment.
- New preipherical components in modern computers.
- Software technologies for modern computers

Specific goals of Subject:
Students will acquire knowledge for modern compurer technologies and how to use this system.

Pedagogical methods:
Lectures will be visualized by tables, slides and presentations. In seminar exercises a real computer application will be observed and simple examples will be developed.
Preliminary requirements
Basic knowledge in electronic shemes and logical mathematics.

Help Materials:
Lectures disposed in Internet (Web site of department), copies of teaching materials and publications.

Assessment:
Examination upon the lecture material. During the semester there are interim tests.

Note: Lection course is useful for students of all natural science specialties.

Visual programing

Subject **Visual programing**	**No 4**	**Semester** **3 semester**
Type of lecture Lectures/Seminars	**Hours (Week) / semester** 2 L / 2S / Winter semester	**Credits** 6.0

University/Faculty/Department: SWU "Neofit Rilski", Blagoevgrad, Ivan Michailov 66/ Mathematics & Natural Science Faculty "Computer systems and technologies"

Status of the Subject: Optionally Subject

Description of Subject:

- Programming languages (objective and visual) and different tools for dynamic visual programming technique.
- Using the database in visual applications and object oriented anguaget technologies.
- Delphi programming environment.
- Database in Delphi.
- .Net and J2EE conception for developing the Web applications.

Specific goals of Subject:
Students will acquire knowledge for modern software technologies and how to use this system.

Pedagogical methods:

Lectures will be visualized by tables, slides and presentations. In seminar exercises a real computer application will be observed and simple examples will be developed.
Preliminary requirements
Basic knowledge in computer programming and logical mathematics.

Help Materials:
Lectures disposed in Internet (Web site of department), copies of teaching materials and publications.

Assessment:
Examination upon the lecture material. During the semester there are interim tests.

Applied Informatics

Title: Applied Informatics
Semester: 3rd semester
Type of Course: lectures and labs
Hours per week – 2 lectures + 1 labs per week
Credits Numbers: 6.0
Department: Informatics,
Course Status: Elective course from the physics Curriculum.
Course description: The course is providing basic knowledge in development of algorithms, their programming using particular programming language and running and testing of the programs under certain operation system. The structure and the main operational principles of the computer systems are given. The means and accuracy of information presentation are also considered. Some of the key classes of algorithms and data structures are studied. The main techniques of the structural approach of programming and their application using C++ programming language are introduced. The aim of the course is to teach the students with the techniques in development of algorithms and programs using C++ programming language.
Objectives:
Basic objectives and tasks:

- The students give knowledge for algorithum thinking;
- to give knowledge for Data structures, that can process with computer;
- to give knowledge for methods and skills in programming.
- to give knowledge for syntax of a program language (C++);
- to give knowledge for good style in programming;
- to give knowledge for basic principles when develop applications

Methods of teaching: lectures, tutorials, projects, other methods
Pre- requirements: Basic knowledge in Mathematic.
Exam: Written examination and discussion at the end of the semester, individual tasks and the general student's work during the semester.
Registration for the Course: A request is made by students at the end of the current semester
Registration for the Exam: Coordinated with the lecturer and the Student Service Office
References:

1. Магдалина Тодорова *Програмиране на C++. Част I,* Сиела, 2002.
2. Cay S. Horstmann *Computing Consepts with C++ Essentials*, John Wiley & Sons, 1999.
3. Steve Donovan *C++ by Example.* Que/Sams,2002.
4. Христо Крушков *Програмиране на C++*. Пловдив, Макрос, 2006.
5. Herbert Schildt *Teach Yourself C++*, McGraw-Hill, 1998.
6. Брайън Овърленд *C++ на разбираем език.* АлексСофт, 2003.
7. Преслав Наков, Панайот Добриков *Програмиране = ++ алгоритми.* София, 2005.

Specialized preparation in a foreign language

Course Title: Specialized preparation in a foreign language

Semester: 3. (winter) semester

Course type: Seminars, out-of-class work

Hours per week: 4 seminar hours

ECTS credits: 6 credits

University/Faculty/Department: Sowthwest University "Neophit Rilsky", Blagoevgrad, 66 bul. Ivan Michailov, Science and Mathematics Faculty, Department of Physics

Statute of the discipline in the curriculum: Optional

Description of the discipline: The discipline "Specialized preparation in a foreign language" is constructed as a necessary component of the whole preparation of future physicists with a master degree. The course aims at broadening of the foreign language preparation by enriching it with general and special science vocabulary and showing the ways of its specific uses in different texts – abstracts, articles, announcements, monographs, textbooks in physics.

Course objectives: The main objective of the course is the students, to enrich their science vocabulary, to acquire some basic skills to comprehend and interprete different scientific texts, and to know how they are prepared.

Teaching methods: Seninars, individual student out-of-class work

Requirements/Prerequisites: Basic knowledge of English

Assessment: Permanent control, written test.

Registration for the course: It is necessary to apply in the administrative department during the previous semester

Solar architecture

Subject **Solar architecture**	**No 8**	**Semester** **3 semester**
Type of lecture Lectures/Seminars	**Hours (Week) / semester** 2 L / 2 S / Winter semester	**Credits** 6.0

University/Faculty/Department: SWU "Neofit Rilski", Blagoevgrad, Ivan Michailov 66/ Mathematics & Natural Science Faculty "Computer systems and technologies"

Status of the Subject: Optionally Subject

Description of Subject:

- Solar Energy. Thermal solar applications.
- Passive solar systems. Types of passive solar systems.
- Direct passive solar systems. Efficient building orientation and form.
- Indirect Passive solar systems.

Specific goals of Subject:
Students will acquire knowledge for modern building technologies and practical experience to use this system.

Pedagogical methods:
Lectures will be visualized by tables, slides and presentations. In seminar exercises a real computer application will be observed and simple examples will be developed.

Preliminary requirements
Basic knowledge in heat physics and mechanics.

Help Materials:
Lectures disposed in Internet (Web site of department), copies of teaching materials and publications.

Assessment:
Examination upon the lecture material. During the semester there are interim tests.

Note: Lection course is useful for students of all natural science specialties.

APPLIED BIOPHYSICS

Course Title: **APPLIED BIOPHYSICS**
Semester**:** **III**
Type of presentation**:** **Lectures and Seminars**
Hours per week AS / SS**:** **2 Lecture hours / 2 Laboratory Classes / AS**
ECTS Credits**:** **6**
Department**: Physics Department**
Course Status: **Elective course in the Physics Science M.Sc. Curriculum**

Short Description**: The thermodynamic approach at study of alive systems. Entropy of alive Nature. Basics of non-equilibrium Thermodynamics. Thermodynamics and information. Phase transitions. Chemical bonds. Fractal structures and scales. Biopolymer Physics. Biomembranes. Unique anomalous properties of Water. Solitons. Radioecology.**

Course Aims**: To acquaint the students with basic physical problems, approaches and methods at study of self-organisation of the Matter and interaction of alive organisms with radiation.**

Teaching Methods**: Lectures and Seminars with decision of theoretical and practical tasks. From methodical point of view the material is arranged from the thermodynamic approach at study of alive systems via Biopolymer Physics to the basic problems of Radioecology..**

Requirements/Prerequisites**: Basic knowledge on Molecular, Atomic and Nuclear Physics.**

Evaluation Method**: Defence of the Labs Protocols L; Two intermediate tests K_1 and K_2 conduct through the semester; Written final exam upon the lecture course.**

Rating**:** $= 0{,}2 \cdot L + 0{,}2 \cdot \left(\frac{K_1 + K_2}{2} \right) + 0{,}6$ **(Exam)**

Inscribing for tuition**: By request at the end of the previous semester.**

Inscribing for exam**: Agreement with the lecturer and the Students Service Department.**

References:
1. **Gramatikov P. S. *Theoretical Biophysics*, Blagoevgrad, 1998 (in Bulgarian).**
2. **Ivanov I. T. *Textbook on Medical and Biological Physics*, Alfa Market, St. Zagora, 2008, (in Bulgarian).**
3. **Marinov M, *Biophysics*, Sofia, 2003, (in Bulgarian).**
4. **Kicheva J. Manual of Medical Physics and Biophysics, GRPI-MON, Sofia, 2002, (in Bulgarian).**
5. **Florov R. J. *Thermodynamics of Biosystems*, BAS Publ. Hous, Sofia, 1988 (in Bulgarian).**

Ecological expertises

ECTS credits: 6 credits **Hours per week: 2 lecture hours, 2 laboratory hours**
Assessment method: Examination Course Status: Elective
Semester: IV
Methodical leadership:
Department of Physics
Faculty of Natural Sciences &Mathematics

Annotation:

The purpose of the course **"Environmental Expertises"** is to give students in "**Modern energy sources and environmental protection**" – "Master" degree basic knowledge of regulations, requirements and approaches to the creation and functioning of effective activities for the preparation of environmental investigations, expertise and assessments.

Students acquire skills to analyze and evaluate the needs of information for the environmental components and the necessity of correct activities for the environmental assessments.

Special attention is given to the aims and objectives of sampling in the environmental management systems (EMS) structure, units and scope of their activities; obligations and information requirements and record keeping of various activities in the management of companies (in terms of conservation environment).

The course **"Environmental Expertises"** provides students with the knowledge and opportunities to participate in teams in developing systems and management plans for environmental protection, plans and programs for the development of strategic environmental assessment (SEA), a report on assessment of the environmental impact assessment (EIA) and other environmental investigations, depending on the specific needs and in compliance with environmental requirements.

Course contents:

№	**TOPIC**	Horaium (hours)
	A) LECTURE	
1.	Nature and characteristics of environmental assessments	2
2.	Types of environmental assessments. Classification. Basic principles.	2
3.	Regulatory framework and requirements for preparation of environmental assessments.	2
4.	Consistency in the environmental assessments preparation. Requirements and quality control.	2
5.	Consultations in the environmental assessments preparation. Necessity. Rights and obligations.	2

6.	Strategic environmental assessments. Purpose. Basic requirements.	2
7.	Environmental expertise. Purpose. Applicability.	2
8.	Environmental impact assessment (EIA). Purpose.	2
9.	Requirements for the environmental assessment experts. Rights and obligations.	2
10.	Requirements for the assessment of environmental impact. Nature and characteristics.	2
11.	Degrees of the environment impacts. Essence. Principles of determination.	2
12.	Public discussion of the environmental assessment reports. Basic requirements. Procedures.	2
13.	Environmental assessment of transboundary plans and programs. Features and requirements.	2
14.	EU policy to improve environmental assessments.	2
15.	Problems in the environmental assessments preparation. Reasons. Approaches for correction and decisions.	2
	All:	**30**
	B) EXERCISES	
1.	*Sample of content and scope of environmental assessment and environmental impact assessment report.*	3
2.	*Justification and structure of consulting assistance.*	3
3.	*Analysis of the requirements in the preparation of environmental assessments.*	3
4.	*Approaches in determining the degree of environmental impact.*	4
5.	*Requirements for the behavior of environmental assessment experts.*	3
6.	*Preparing the main sections of the EIA report and evaluation of quality*	4
7.	*Analysis of environmental violations and approaches for evaluation.*	3
8.	*Role play - public discussion of the environmental assessment report. Organization, conduct and results.*	4
9.	*Samples for classification of the problems with preparing of the environmental assessment reports.*	3
	All:	**30**
	Total:	**60**

Teaching Methods and Assessment:

During the semester students undertake a periodic review by assigning tasks to individual work by analyzing the results of the completed environmental investigations, expertise and assessments, including proposing solutions to emerging problems in their implementation.

Criterion for assessing the degree of implementation of tasks (coursework, research paper, presentation, etc.), Taking into account the levels of competence, analytical skills, ability to aggregate data and proposing solutions, etc.

Works are discussed and protected together with the other students who participate in the evaluation. The activities of all students are accounted for as an additional argument for the exam, or individual sections of the content of the course.

The assessment is carried out of sixth-form system, depending on the task as follows:

Excellent	6	- over 89%
Very good	5	to 70% - 89%
Good	4	to 45% - 69%
Average	3	to 30% - 44%
Poor	2	- below 30%

For unusual activity of a student in the educational process (100% fulfillment of the tasks of the current control, active participation in proper methodological discussion of lecture material) it is possible to exempt from semester exams.

The share of current control weighting is 50%, taking into account differences in the relative weight of coursework, essays or presentations (usually between 70% and 30%).

Until the exam is allowed only students who have met the requirements of the Regulations for the educational activities of SWU "Neofit Rilski", and have met the requirements for mastering the course content set in their auditorium and individual employment and overall assessment of the current control is at least Average (3).

The examination process includes a written exam topics (at least two) of the content of the course syllabus distributed in advance. The relative weight of the total test score is 50%.

The assessment is carried out in six-point scale, according to Law of higher education and Ordinance № 21 of the Ministry of education and science – (30.09.2004).
Credits are awarded only if the total score is equal to or higher than the average (3), according to the system of accumulation and transfer of credits.

REFERENCES

1. Glasson J., R.Therivel, An.Chadwick (2011). Introduction To Environmental Impact Assessment (Natural and Built Environment Series). Routledge. ISBN-10: 0415664705.
2. Lawrence D.P. (2003). Environmental Impact Assessment: Practical Solutions to Recurrent Problems. Publisher:Wiley-Interscience.
3. Marriott B. (1997). Environmental Impact Assessment: A Practical Guide. McGraw-Hill Professional; ISBN-10: 0070404100.
4. Methods of Environmental Impact Assessment (2009). Morris **P.**, R.Therivel **(eds.)** Routledge.
5. Morris P. (2008). Methods of Environmental Impact Assessment. Publisher: Built Environment.
6. Perdicoulis A., Br.Durning, L.Palframan (Eds) (2012). Furthering Environmental Impact Assessment: Towards a Seamless Connection Between EIA and EMS. Edward Elgar Publishing Ltd. ISBN-10: 0857933272.
7. Schmidt M., J.Glasson, L.Emmelin (2008). Standards and Thresholds for Impact Assessment. Publisher: Springer Berlin.
8. Tromans St., K. Fuller (2003). Environmental Impact Assessment: Law and Practice. Publisher: LexisNexis UK. ISBN-10: 0406959544.
9. Wathern P. (eds.) (1988) Environmental Impact Assessment. Theory and practice. Routledge.

Modern methods for examination of aerospace and natural environment

ECTS credits: 5 credits **Hours per week: 2 lecture hours, 2 lab. hours**
Assisment method: Examination **Course Status: Elective**
Semester: IV
Methodical leadership:
Department of Physics
Faculty of Natural Sciences &Mathematics
Short Description:

The aerospace and natural environment is closely related, because of the continuous solar- terrestrial interactions. The Sun as a main source of energy gives serious influence on: litho-, magneto-, atmo-, hydro- and biosphere of the Earth, which destiny is determined of the

going global processes of changes and also of the possible and occasional interactions with other small celestial objects.

The particles and the photons of the cosmic background are main carriers of information for the parameters of the aerospace environment, explored with satellite and also with ground based instruments.

The atmosphere and going in it transport processes are in close relation with the aerozol transfer of radionuclides, heavy and toxic metals and chemical pollutions.

The content of ozone, radon and carbon dioxide is of essential significance for the global climatic changes at the Earth. The influence of the cosmic background on the changes of some meteorological parameters is noticeable.

The importance of the radioecology in the complex monitoring and control of the environment is undisputable. All this subjects closely related each other into an integrated *noisy* information system, are the main source of information for the parameters of the aerospace and natural environment, whish could be obtained by solving this complex inverse problems.

Teaching Methods: lectures, practical exercises, individual student's work

Requirements/Prerequisites: Physics, Mathematical Analysis

Assessment: written terminal examination.

Two homeworks (marks D1, D2) and two written tests (marks K1, K2) are rated for continuous assessment during the semester. Only students with average rating from the continuous assessment greater than 3 are allowed to go on a examination.

The mark at the terminal examination (Exam) has the main weight in the final rating.

Rating = $0{,}05 .(\frac{D1+D2}{2}) + 0{,}15 .(\frac{K1+K2}{2}) + 0{,}8\ (Exam)$

.

Registration for the Course: by request at the end of the current semester (when is not obligatory course).

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

References:

1. Murzin, V. S. , Introduction in Cosmic Rays Physics, Moscow, Atomizdat , 1979
2. Dorman, L. I. , Variations of Galactic Cosmic Rays, Moscow University Publishing House, 1975

Photovoltaic conversion of solar energy

Subject **Photovoltaic conversion of solar energy**	**No 4**	**Semester** **4 semester**
Type of lecture Lectures/Seminars	**Hours (Week) / semester** 2 L / 2 S /Summer semester	**Credits**

University/Faculty/Department: SWU "Neofit Rilski", Blagoevgrad, Ivan Michailov 66/ Mathematics & Natural Science Faculty "Physics"

Status of the Subject: Optional Subject

Description of Subject:

1. Physical principles of solar energy conversion. Photovoltaic conversion of solar energy.
2. Introducing in technology for photovoltaic panels. Thin layers. Semiconductor materials.
3. Electricity generation in photovoltaic elements. Energy efficiency of photovoltaic converters.
4. Materials for photovoltaic panels. Silicon – amorphous and crystal structure. Photovoltaic converters based on organic materials.
5. I – V diagram of Photovoltaic elements. Experimental and testing equipment for PV.
6. Solar PV Installations. Photovoltaic controllers (inverters).
7. Application of PV elements. Link with the conventional electricity net.
8. Ecological problems in solar energy applications.

Specific goals of Subject:
Students will acquire knowledge for modern solar technologies and practical experience to use this system.

Pedagogical methods:
Lectures will be visualized by tables, slides and presentations. In seminar exercises a real computer application will be observed and simple examples will be developed.

Preliminary requirements
Basic knowledge in mathematics and physics.

Help Materials:
Lectures disposed in Internet (Web site of department), copies of teaching materials and publications.

LASER METHODS IN INVESTIGATION OF ENVIRONEMENT

Semester: IV
Type of presentation: Lectures and Laboratory classes
Hours per week AS / SS: 2 Lecture hours / 2 Laboratory hour / SS
ECTS Credits: 5
Department: Physics Department; Phone: +359/73/8889137

Course Status: Elective course in the Physics Science M.Sc. Curriculum

Short Description: The course considers laser methods in study of pollutions in atmosphere, and laser diagnostics in investigation of bioactivity of water medium, rivers and sea. Modern laser methods are presented in study of components of natural media and their protecting. Structure of nature is studied to determine main ecological reserves.

Teaching 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 course.

The students extra-curriculum activity represents the preparation of a scientific experimental research; conducting physical studies; testing.

Requirements/Prerequisites: Basic knowledge on General Physics & Mathematics.

Evaluation Method: The assessment of the students` results is done accordingly to the ECTS. The final rating is formed at the end of the course on the basis of the rating of a written test on all topics mentioned above, on the basis of the rating of the student`s routine control and using the rating of the student`s extra-curriculum activity in the following ratio.

Final grade calculation is done by using a 6-point rating scale: the rating 6 equals level A on ETCS; the rating 5 equals level B on ETCS; the rating 4 equals level C on ETCS; the rating 3 equals level D on ETCS; the rating 2 equals level E on ETCS.

Inscribing for tuition: By request at the end of the previous semester.
Inscribing for exam: Agreement with the lecturer and the Students Service Department

---

ENERGETICS AND ECOLOGICAL PROBLEMS

Course Title: ENERGETICS AND ECOLOGICAL PROBLEMS
Semester: IV
Type of presentation: Lectures and Laboratory classes
Hours per week AS / SS: 2 Lecture hours / 2 Laboratory hour / SS
ECTS Credits: 5

Department: Physics Department

Course Status: Elective course in the Physics Science B.Sc. Curriculum

Short Description: Introduction. Thermal motors and machines. Organic fuels. Processes and products of combustion. Industrial and power boilers. Thermal and Nuclear power plants. Basics of the Building Physics. Energy efficiency and environmental saving. Kyoto Protocol and Energy Efficiency Act.

Course Aims: The students acquire basic knowledges about methods of effective output, transformation, transfer and use of energy from conventional and alternative sources, as well as with methods for environmental protection and legislative framework for that.

Teaching Methods: Lectures and Laboratory classes. From the Methods point of view material is arranged from Conventional & Alternative Energy Sources via Energy efficiency and environmental protection to the legislative framework for that.

Requirements/Prerequisites: Basic knowledge on General Physics & Mathematics.

Evaluation Method: Defence of the Labs Protocols L; Two intermediate tests K_1 and K_2 conduct through the semester; Written final exam upon the lecture course.

Rating: $= 0{,}2.L + 0{,}2.\left(\frac{K_1 + K_2}{2}\right) + 0{,}6\ (\text{Exam})$

Inscribing for tuition: By request at the end of the previous semester.
Inscribing for exam: Agreement with the lecturer and the Students Service Department

References:
1. Girardet H. & M. Mendonca. *A Renewable World – Energy, Ecology, Equality*, Green Books Ltd, UK, 2009.
2. Saxena A. B. *Textbook of Energy, Environment, Ecology and Society*, New Age Int., 2011.
3. Hadjigenova N. P. *Thermal Part of TPP*, Technics, Sofia, 1979 (in Bulgarian)
4. Anderson B. *Solar Energy*, Strojizdat, Moscow, 1982 (in Russian)
5. *Energy Efficiency Act*, St. Gazette, Sofia, March 05, 2004 (in Bulgarian)

Philosophical problems of physics

Course Title: Philosophical problems of physics
Semester: 4 semester

Course type: Lectures, seminars, out-of-class work

Hours per week: 2 lecture hours + 2 seminar hour

ECTS credits: 5 credits

University/Faculty/Department: Sowthwest University "Neophit Rilsky", Blagoevgrad, 66 bul. Ivan Michailov, Science and Mathematics Faculty, Department of Physics

Statute of the discipline in the curriculum: Optional

Description of the discipline: The discipline "Philosophy of physics" is constructed as a necessary component of the whole preparation of future physicists with a master degree. The course content aims at philosophical rationalization of scientific discoveries referring the historical path of the physical science, the struggle of ideas that brought to its development and progress, its crucial discoveries, and turning points.

Course objectives: The main objective of the course is the students, to think over the place of the physical science in the common context of knowledge and intellectual development. The notion of science as a product and as a process as well, will promote the formation of a more integral scientific picture of nature, of own scientific world view.

Teaching methods: lectures, seminars, individual student out-of-class work

Requirements/Prerequisites: General physics course

Assessment: course work and its discussion, written examination.

Registration for the course: It is necessary to apply in the administrative department during the previous semester