



# СОФИЙСКИ УНИВЕРСИТЕТ „СВ. КЛИМЕНТ ОХРИДСКИ”

ФАКУЛТЕТ      ФИЗИЧЕСКИ

## УЧЕБЕН ПЛАН

Утвърждавам: .....

Утвърден от Академически съвет с протокол  
№ ..... / .....

Професионално направление:

Ф И З И Ч Е С К И   Н А У К И

ОКС „магистър”

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Специалност:

Магистърска програма:

ФИЗИКА НА ЯДРОТО И ЕЛЕМЕНТАРНИТЕ ЧАСТИЦИ - I

Форма на обучение: редовна

Продължителност на обучението (брой семестри): 3 (три)

Професионална квалификация: *Магистър по физика – физика на ядрото и елементарните частици*

## Квалификационна характеристика

**Специалност:** *Физика*

**Магистърска програма:** *Физика на ядрото и елементарните частици*

### 1. Насоченост, образователни цели

The Master of Science program in **Nuclear and Particle Physics** is foreseen for specialists with Bachelor degree in physics and knowledge in nuclear and particle physics (according to the academical record). The aim of the program is to prepare highly qualified specialists in the field of nuclear, particle and radiation physics.

### 2. Обучение (знания и умения, необходими за успешна професионална дейност; общо теоретична и специална подготовка и др.)

An advantage of the MSc program in Nuclear and Particle Physics is that there are no mandatory courses and all the courses are eligible. The education is performed mainly by tutors from Atomic Physics Department of the Faculty of Physics. During the MSc program first and second semester, the students should listen to courses take an exams on eligible subjects (see the content of the study plan) corresponding to 30 credits per semester. At least 4 subjects among the eligible subjects should be from group one. The courses from group one are the basic courses of the MSc program. The rest of the eligible courses are give more in-depth and specific knowledge in a field chosen by the student and even could be a course from one of the following MSc programs: Theoretical and mathematical physics, Nuclear energetics an nuclear technology or Medical physics. The total number of the courses, selected by the student, for the two semesters should be at less 10. The third semester is dedicated to research work (under the supervision of tutor), writing of diploma thesis and participation in scientific seminars (30 credits in total).

### 3. Професионални компетенции

The graduated students would obtain Master degree as well as deep knowledge and skills in very important fields with excellent future perspective like nuclear physics, particle physics, nuclear technologies, detector physics. The students finished the MSc program in Nuclear and Particle physics would be able to work with nuclear physical equipment and dedicated software for

physical simulations and data analysis. The students finished the MSc program in Nuclear and Particle physics would have necessary knowledge and skills to start a successful career in the field of Nuclear and Particle Physics and to work as researchers in Bulgaria and/or abroad. The knowledge and the practical skills of the students, successfully finished the program, would allow them to start a successful career in the nuclear industry, hospitals (as medical equipment maintainers) or in the software industry. The knowledge and the skills of the students, successfully finished the program, are also practically oriented which would allow them to start a successful career in the nuclear industry, hospitals (as medical equipment maintainers) or in the software industry.

#### 4. Професионална реализация

##### A possible career development:

- in institutes and laboratories for fundamental research in the field of Atomic, Nuclear and particle physics;
- in research or applied laboratories where nuclear instrumentation and methods are used: NPP Kozloduy, radiochemical laboratories, laboratories for dosimetry and radiation protection, radio-ecology, medical equipment development
- in the hospitals (medical equipment set-up, control and maintenance)
- in the nuclear industry
- in the software industry (modelling, simulation and data analysis)

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код на спец.

Специалност "Physics" / "Nuclear and Particle Physics MSc Programme"

за випуска, започнал през ..... уч.година

№	код на дисциплината	Name of the course	Type of the subject	Term	ECTS credits	Часове - общ брой				hours per week	E-examination R-rating
						All	Lectures	Seminars	Practical exercises		
1	2	3	4	5	6	7	8	9	10	11	12

11/12/2015 г.

3 от 5

През първи и втори семестър студентите избират минимум четири дисциплини от "Избираеми дисциплини първа група"

**Избираеми дисциплини – избраните дисциплини трябва да носят минимум 30 кредита**

**Optional course - I group**

1				Standard model of the Strong and Electroweak Interactions	O	1	6	180	60	0	0	4 0 0	E
2				Symmetries in the Elementary Particle Physics	O	1	4,5	135	45	0	0	3 0 0	E
3				Nuclear Models	O	1	4,5	135	45	0	0	3 0 0	R
4				Nuclear Structure	O	1	6	180	45	15	0	3 0 0	E
5				Modelling of the Physics Experiment	O	1	6	180	30	0	30	2 0 2	R
6				Theory of Nuclear Reactions	O	1	6	180	45	15	0	3 1 0	E
7				Radioactivity in the Environment and Radioecology	O	1	7,5	225	30	0	45	2 0 3	E
8				Nuclear Electronics 2	O	2	9	270	45	0	45	3 0 3	R

**Optional course - II group**

9				Weak Interactions of the Elementary Particles	O	1	6	180	60	0	0	4 0 0	E
10				Object-Oriented Programming	O	1	10,5	315	45	0	60	3 0 4	E
11				Theoretical astrophysics	O	2	6.0	180	60	15	0	4 1 0	E
12				Supersymmetries , quantum deformations and models of interacting systems	O	2	4,5	135	45	0	0	3 0 0	E
13				Introduction to the string and superstring theory	O	2	4	120	45	0	0	3 0 0	E
14				Automatization of the physics experiment	O	2	4.5	135	45	0	0	3 0 0	E
15				Radiochemistry	O	2	7.5	225	30	0	45	2 0 3	R
16				Practical Chemistry	O	2	3,5	105	0	15	30	0 1 2	R
17				Mössbauer effect and Mössbauer spectroscopy	O	2	6	180	45	0	15	3 0 1	E
18				Radiation biophysics	O	2	4.5	135	45	0	0	3 0 0	E

19				<b>Modern problems of the nuclear physics</b>	O	2	4.5	135	45	0	0	3 0 0	E
20				<b>Medical Image Processing and Analysis</b>	O	1	3,5	105	30	0	15	2 0 1	E
21				<b>Introduction to the high performance computing</b>	O	2	4	120	30	0	15	2 0 1	R
22				<b>Beyond the Standard Model</b>	O	2	4,5	135	45	0	0	3 0 0	R
23				<b>Metrology of ionizing radiation</b>	O	1	6	180	30	0	30	2 0 2	E

\*) C – compulsory O – optional, F- facultative.  
E - examination; R - rating

#### Practical work

№	код			Name of the practice	C, O, F	term	ECTS - credits	weeks	hours	Форма на контрол* - И, ТО, КИ
				<b>Research work</b>	O	3	12	15	360	R
				<b>Research seminar</b>	O	3	3	15	90	R

#### Graduation

Graduation	ECTS - credits	First final examination first session	Second final examination second session
<b>Diploma thesis defence</b>	15	<b>February - March</b>	<b>June - July</b>

The syllabus is ratified by the Faculty council (Minutes № )

DEAN: