



SOFIA UNIVERSITY "ST. KLIMENT OHRIDSKI"

FACULTY: Physics

CURRICULUM

Signed by:



Approved by the Academic Council,
Record of Proceedings №

6 / 30.03.2022 год.

Professional Field: 4.1 Physical Sciences

Educational and Qualification Degree: Master of Science

Specialty: MEDICAL PHYSICS

Subject Area: P H P 2 1 0 1 2 2

MEDICAL PHYSICS

Form of Study: Full-time

Length of Study: 3 semesters

Professional Qualification: Master of Science in Medical Physics

Qualification Description

Subject Area: Medical Physics

MA Program: Medical Physics

1. Educational objectives

The Medical Physics Master's program is designed for professionals with a bachelor's degree in Physics. It aims to prepare highly qualified specialists in the field of the Medical physics.

The Medical Physics is a branch of Applied Physics which is pursued by medical physicists. It is a scientific discipline which applies physical principles, phenomena and methods in the prevention, diagnosis and therapy with a specific goal of improving human health and well-being.

The Master of science in Medical Physics is a person with a university degree in physics, which works with medical professionals in hospitals, laboratories, universities or research institutes on the application of physical methods for the prevention, diagnosis and treatment of human diseases.

2. Description

During the course of the Master's program, the students acquire knowledge in the following areas:

- + Radiation Physics, Atomic and nuclear physics, radiation detection and measurement;
- + Radiation therapy physics, Radiation treatment planning;
- + Physics of Medical imaging (IMR, US, CT, Nuclear medicine), Medical imaging fundamentals
- + Dosimetry and Radiation Protection, Environmental radioactivity;
- + Detectors of ionizing radiation, Monte Carlo simulation of radiation transport;
- + Biophysics modelling of biomolecular interactions, materials for biomedical applications;
- + Statistical data processing in medical-biological research;

The master of science in Medical physics acquires basic skills in order to be able to:

- Use his knowledge on physics, anatomy, physiology and biophysics to apply physical principles and methods in medical diagnostics and treatment activities;
- Applies his knowledge on radiation physics, radiation therapy physics, radiation dosimetry and radiation protection in the clinical practice in nuclear medicine and radiotherapy departments.
- Advice on measures for radiation protection, risk assessment and environmental radioactivity.

Graduation of the students from the Master's program

The Master of Science in Medical physics program has a total duration of year and a half or 3 semesters. The graduation requires a successful completion of the exams specified in the curriculum of the program, which provides in total 75 ECTS-credits, and a successful thesis defense. The thesis defense is after the end of the last (third) semester and provides 15 ECTS-credits.

3. Professional Qualifications

The Master of science in Medical Physics has the competences to:

- + Apply basic physical principles and method in medical diagnosis and treatment, based on his knowledge on anatomy, physiology and the biophysics of human body.
- + Apply his expertise on radiation detection and measurement, the basic dosimetry principles for measurement of the quantities of practical interested in the field of medical physics. Participate in the process of the radiation treatment planning and quality control procedures in radiotherapy;
- + Apply his knowledge on the basic imaging technologies in diagnostic radiology and nuclear medicine and participate in the quality control procedures of the equipment;
- + Applies the basic radiation protection principles to ensure radiation safety of the patient and the personnel, as well as for the protection of the environment;
- +Applies the scientific method and innovational approaches in solving practical problems.

4. Professional Realization

The master of science in Medical Physics can work as a medical physicist in hospitals, as a specialist in State Ministries and State enterprises, medical diagnostic centers, cancer centers, environmental laboratories, companies for medical devices and equipment, research institutes and universities.

The master of science in Medical Physics may pursue a career in a number of sub-fields (specialities) such as: Radiation Oncology Physics, Medical Imaging Physics, Nuclear Medicine Physics, Medical Health Physics (Radiation Protection in Medicine), Non-ionizing Medical Radiation Physics, and Physiological Measurement. They may also pursue a career in neighbouring fields such as Biophysics, Biological Physics, and Health Physics.

The educational profile of the Master of science in Medical physics program allows him to pursue a career in:

- + Radiotherapy physics;
- + Imaging diagnostics (X-ray, radionuclide, ultrasound, magnetic resonance, CT, including quality control of medical equipment);
- + Nuclear Medicine (PET, SPECT, PET/CT, SPECT/CT, multimodality systems);
- + Radiation protection, measurement of ionizing radiation, radioactivity measurements in nuclear industry;
- + Expert assessment of imaging equipment and other medical equipment. Measurement of physical anthropogenic factors;
- + Environmental control and assessment of the environmental impact of various physical factors.

Since 2022, the Master of science in medical physics can occupy the profession Physicist – Medical Physics according to the Bulgarian National classification of occupations and positions.

5. Terms of acceptance

Applicants to the MSc program are expected to have a bachelor's degree in Physics, Engineering, Mathematics or other natural sciences from an accredited university. The minimum undergraduate coursework must include at least 400 hours in basic undergraduate mathematics courses and at least 700 hours in basic undergraduate physics courses. The basic undergraduate mathematics courses include: Linear Algebra and Analytic Geometry, Calculus, Multivariate Calculus, Vector and tensor calculus, Ordinary differential equations, Partial differential equations, Probability and Statistical Methods or their equivalent. The basic physics courses include: Mechanics, Molecular Physics, Optics, Electricity and magnetism, Atomic physics, Nuclear Physics, Mechanics laboratory, Molecular physics laboratory, Optics laboratory, Electricity and magnetism laboratory, Atomic physics laboratory, Nuclear physics laboratory, Thermodynamics, Quantum mechanics or their equivalent. Some facility in computer programming and electronic instrumentation is recommended. Chemistry and an introductory course in biology are advantageous.

Applicants with deficiencies in their undergraduate curriculum may be accepted or conditionally accepted into the program at the discretion of the Head of the Program. Students accepted on a conditional basis may be required to take additional classes to address coursework deficiencies.

An English language level B2 is required for admission in the program.

PHP 2 1 0 1

Program code
Program code

Subject Area "MEDICAL PHYSICS" / Name of MA Program "MEDICAL PHYSICS"

academic year beginning from 2022/ 2023

№	Course code	Course Title	Type – C, E, O	Term	ECTS credits	Number of classes- total				Number of classes per week	Type of Grading* - e, ca, m, a
						Total	Lectures	Seminars	Practical classes / practice		
1	2	3	4	5	6	7	8	9	10	11	12

Compulsory courses I semester

1	M 8 7 8	Radiation Physics	C	1	9	270	45	15	45	3+1+3	E
2	M 8 7 9	Medical Statistics	C	1	4	120	30	30	0	2+2+0	E
3	M 8 8 0	Anatomy and Physiology for Medical Physicists	C	1	5	150	30	0	30	2+0+2	E
4	M 8 8 1	Biophysics	C	1	5	150	30	0	30	2+0+2	E
5	M 8 8 2	Dosimetry and Radiation Protection	C	1	7	210	45	0	45	3+0+3	E

Compulsory courses II semester

6	M 8 8 3	Medical Diagnostic Nonionizing Methods (US and MRI)	C	2	6	180	45	0	30	3+0+2	E
7	M 8 8 4	Physics of Nuclear Medicine	C	2	3	90	30	0	15	2+0+1	E
8	M 8 8 5	Physics of Diagnostic Radiology	C	2	3	90	30	0	15	2+0+1	E
9	M 8 8 6	Radiation Therapy Physics	C	2	5	150	45	0	15	3+0+1	E

1	2				3								4	5	6	7	8	9	10	11	12
10	M	8	8	7	Monte Carlo Modelling of Radiation Transport								C	2	3	90	30	15	0	2+1+0	E

Compulsory courses III semester

11	M	8	8	8	Medical Imaging Fundamentals								C	3	5	150	30	15	0	2+1+0	E
----	---	---	---	---	------------------------------	--	--	--	--	--	--	--	---	---	---	-----	----	----	---	-------	---

Elective Courses

During the second semester the students must select minimum 2 selective courses for 10 ECTS																					
During the third semester the students must select minimum 2 selective courses for 10 ECTS																					
1	M	8	8	9	Radiation Treatment Planning								E	2,3	5	150	30	0	30	2+0+2	E
2	M	8	9	0	Detectors of Ionizing Radiation								E	2,3	5	150	30	0	30	2+0+2	E
3	M	8	9	1	Environmental Radioactivity								E	2,3	5	150	30	0	30	2+0+2	E
4	M	8	9	2	Modelling of Biomolecular Interactions								E	2,3	5	150	30	0	30	2+0+2	E
5	M	8	9	3	Electronics in Medicine								E	2,3	5	150	30	0	30	2+0+2	E
6	M	8	9	4	Project Management in Medical Physics								E	2,3	5	150	30	30	0	2+2+0	E
7	M	8	9	5	Laser Technologies in Medicine								E	2,3	5	150	30	30	0	2+2+0	E
8	M	8	9	6	Materials for Biomedical Applications								E	2,3	5	150	30	0	30	2+0+2	E

Study Internships

No	code	Internship	Type - C, E, O	Semester	ECTS - credits	Weeks	Number classes	Type or course completion

1	2	3	4	5	6	7	8	9	10	11	12

Teaching practice

№	КОД	Title	Type - C, E, O	Semester	ECTS - credits	Weeks	Number classes	Type or course completion

Degree completion

Form of degree completion	ECTS credits	First state exam/thesis defence session	Second state exam/thesis defence session
Diploma Thesis Defense	15	March	July

The curriculum has been approved by the Faculty Council, Record of Proceedings № 5 from 15.03.2022

DEAN:.....



Sofia University "St. Kliment Ohridski"

Curriculum Reference Statement

Subject Area / BA Program/ MA Program

Form of study: Full-time length of study: 3 semesters

Course Load, ECTS -credits and course completion per semester																																	
Type of courses	I			II			III			IV			V			VI			VII			VIII			IX			X			Total		
	Course Load - number of classes	ECTS – credits	number of grades	Course Load - number of classes	ECTS – credits	number of grades	Course Load - number of classes	ECTS – credits	number of grades	Course Load - number of classes	ECTS – credits	number of grades	Course Load - number of classes	ECTS – credits	number of grades	Course Load - number of classes	ECTS – credits	number of grades	Course Load - number of classes	ECTS – credits	number of grades	Course Load - number of classes	ECTS – credits	number of grades	Course Load - number of classes	ECTS – credits	number of grades	Course Load - number of classes	ECTS – credits	number of grades			
Compulsory courses	900	30	5	600	20	5	150	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	###	55	11
Min. of elective courses	0	0	0	300	10	2	300	10	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	600	20	4
Study internships	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total:	900	30	5	900	30	7	450	15	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	###	75	15

Diploma Thesis Defense	ECTS - credits	number of hours for preparation	exam/ thesis defence session	state exam/ thesis defence
Diploma Thesis Defense	15	450	March	July

Professional Qualification:

Master of Science in Medical physics

Record of Proceedings of the Faculty Council № 5/15.03.2022

Dean:

