

## In the Name of God

### Islamic Republic of Iran Ministry of Health and Medical Education Deputy for Education

## Medical Physics Degree: Master of Science (MSc)

### Total Course Credits

- Core: 19
- Non-core (Electives): 7
- Thesis (MSc): 6

### Program Description

Medical physics has long played an important role in improving health. The discovery of X-rays in the late 19th century followed by the use of other ionizing and non-ionizing radiations or the innovation and development of imaging and radiotherapy methods are some examples of this important role. At present, medicine is increasingly relying on medical physics.

The Master of Science degree in medical physics is a postgraduate program with an emphasis on physics and technology. It uses physical techniques and principles in diagnosis and treatment of diseases. Nowadays, medical physics is divided into different specialties, the main ones being radiotherapy, medical imaging, nuclear medicine, ultrasound, dosimetry, radiation protection and radiobiology, as well as other subjects such as biomechanics, bioelectricity, optics and laser.

The main objective of this program is to:

- familiarize the students with different medical physics specialties for diagnosis and therapy of diseases.
- create an ability in graduates to gain knowledge in medical physics independently.
- disseminate the knowledge of medical physics
- improve the healthcare, diagnosis and therapeutic methods in medicine.
- provide a series of educational, research and therapeutic services using the latest scientific principles and methods.

### Admission Requirements

In addition to the general conditions required by the medical branch of the Supreme Council of Educational Planning' regulations, all candidates are expected to have at least a BS degree (Bachelor of Science) in one of the following disciplines awarded by one of the national or international universities accredited by the Ministry of Health, Treatment and Medical Education: Physics, Radiology technology, Biophysics, Radiotherapy technology, Nuclear medicine technology, Medical engineering, Nuclear engineering (medical radiation sciences field), Physiotherapy or Laboratory sciences.

\*Important note: These conditions do not necessarily exclude specific requirements demanded by some institutes or universities.

## Expected Competencies at the End of the Program

### General Competencies\*

#### Specific Competencies and Skills

At the end of the program learners will be competent in the following skills:

- Contributing to teaching medical physics to students of various fields according to the university's needs. For example, clinical specialist residency programs in radiotherapy, radiology, nuclear medicine and physical medicine all include medical physics topics.
- Designing, implementing and evaluating basic research and applied techniques in various contexts of the related fields.
- Providing expert services for universities as well as diagnostic and therapy centers. The graduate can provide consulting services on the physics and technology aspects of methods and equipment used in medicine.

### Educational Strategies, Methods and Techniques\*

#### Student Assessment (Methods and Types)

##### a) types of assessment

- Formative (Quizzes and Mid-term)
- Summative (Final)
- Comprehensive exam; monitoring the progress and completion of the thesis.

##### b) Methods of assessment

- Written, verbal, OSLE and Logbook-based assessments

### Ethical Considerations\*

\*Note: The related document(s) can be found at <http://hcmeq.behdasht.gov.ir/>.

## Tables of the Courses

**Table 1. Compensatory courses**

Code of the course	Title of the Course	Credits			Teaching Hours		
		Theoretical	practical	total	theoretical	practical	total
01	General English	2		2	34		34
02	Mathematics	2		2	34		34
03	Biostatistics	2		2	34		34
04	Basic Computer sciences & its medical applications	2	1	3	34	34	68
05	Research methods in Health sciences	1.5	0.5	2	26	17	43
06	Basic electronics	1.5	0.5	2	26	17	43
07	Physiology & Anatomy	2+1		3	51		51
08	Cell biology & Genetics	2		2	34		34
09	Diagnostic radiology physics	2		2	34		34
10	Atomic & nuclear physics	2		2	34		34
11	Medical information systems	0.5	0.5	1	9	17	26
<b>Total</b>		20.5	2.5	23	349	85	434

Students should choose some of the compensatory courses (Table 1) as specified by the Department of Education and approved by the Postgraduate Education Council.



**Table 2. Core Courses**

Code of the course	Title of the Course	Credits			Teaching Hours			Prerequisite or Concurrent Courses
		Theoretical	practical	total	Theoretical	practical	total	
12	Basic radiation detection & dosimetry	1.5	0.5	2	26	17	43	10
13	Conventional medical imaging systems	2		2	34		34	09
14	Radiobiology	2		2	34		34	
15	Ionizing radiation protection	1.5	0.5	2	26	17	43	12
16	Physics of nuclear medicine	1.5	0.5	2	26	17	43	12
17	Physics of radiation therapy(1)	1.5	0.5	2	26	17	43	12
18	Magnetic resonance imaging	1		1	17		17	13
19	Physics of ultrasonic waves & its medical applications	1.5	0.5	2	26	17	43	
20	Medical physics terminology	2		2	34		34	01
21	Seminar	2		2	34		34	
22	Thesis		6	6				
<b>total</b>		16.5	8.5	25	283	289	572	



**Table 3. Non-Core Courses**

Code of the course	Title of the Course	Credits			Hours			Prerequisite or Concurrent Courses
		Theoretical	practical	total	Theoretical	practical	total	
23	Laser & its medical applications	1		1	17		17	10
24	Non- ionizing radiation protection	2		2	34		34	10
25	Physics of radiation therapy (2)	1.5	0.5	2	26	17	43	17
26	Radiation oncology	2		2	34		34	17
27	Environmental radiation Monitoring and disposal	1.5	0.5	2	26	17	43	15,16,17
28	Quality control of radiographic imaging systems	1	1	2	17	34	51	13
29	Electricity & magnetism and their medical applications	1		1	17		17	07 , 08
30	Physics of lights & Optometry	0.5	0.5	1	9	17	25	
31	Physics of sound & audiometry	1		1	17		17	
32	Physical principles of laboratory instruments	1.5	0.5	2	26	17	43	
33	Teaching technology and methodology	1.5	0.5	2	26	17	43	
34	Medical digital imaging processing	1.5	0.5	2	26	17	43	13
<b>total</b>		16	4	20	274	136	410	

\*Students should choose 7 credits as specified by the corresponding department.



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