

In the Name of God

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

Molecular Medicine

Degree: Doctor of Philosophy (PhD)

Total Course Credits

- Core: 24
- Non-core (Electives): 6
- Dissertation: 20

Program Description

Although the concept of molecular medicine was introduced in 1949, a great deal of developments in this field, especially in European and American countries, has taken place during recent years. Bearing in the mind the strategic significance of this area of knowledge, a considerable number of universities worldwide grant scholarships annually to students of this field of study. Iranian universities inaugurated Molecular Medicine in 2007 and due to the urgent escalating need for graduates of molecular medicine each year, an increasing number of universities receive students in this major. Molecular medicine, as an interdisciplinary field of study, contributes to understanding the molecular basis of the etiology and mechanisms of diseases and various disorders along with fundamental and heuristic research on different areas of diseases including prevention, diagnosis, and treatment. Dissemination of the science of molecular medicine through a blend of education and clinical research emphasizing active learning and up-to-date research will significantly contribute to the expansion of the borders of medicine and eventually improvement of health in society.

Among the values of the field are practicing creativity and innovation to analyze lessons learned and research to utilize molecular medicine findings to solve problems related to public health. In this regard, graduates focus on social justice and human equality, the rights of patients, regardless of age, sex, color, race, culture and religion and any activity would be with regard to the protection of human dignity. In the next ten years, Molecular Medicine graduates will be able to expand the frontiers of knowledge in the field of Molecular Medicine in the region and improve the country's ranking in this area to the top by taking advantage of the integration of basic and clinical research activities, while establishing and promoting the discipline in the scientific community. This program aims to educate knowledgeable, capable, and committed people at the Ph.D. level. Graduates will be able to design and lead medical research at cellular and molecular levels. The main objective is training professional and expert human resources in educational practice and research activities in the field of Molecular Medicine

Admission Requirements

- Having a general doctorate degree in Medicine, Dentistry, Pharmacy, Veterinary Medicine, Laboratory Sciences and Medical specialties and subspecialties, or a Master of Science in Bacteriology, Biophysics, Physiology, Human Genetics, Mycology, Medical Biotechnology, Medical Entomology and Vector Control, Hematology and Blood Bank, Virology, Biology (Biochemistry, Genetics, Molecular and Cellular and Microbiology), Parasitology, Microbiology, Immunology, Clinical Biochemistry and Nutrition Sciences awarded by one of

the national or foreign universities approved by the Ministry of Health and Medical Education.

- Succeeding in entrance examination
- Participating in the interview
- Offering a resume
- Presenting Recommendation letters
- Meeting admission criteria based on the regulations of universities

*Important Note: These general conditions do not necessarily exclude specific conditions of each specific institute or university.

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:

Skill	The minimum number of skills to learn			
	Observation	Assistance in fulfilling activities	independent activities	The total number of activities
DNA and RNA Extraction	1	2	10	13
PCR and RT-PCR	1	2	10	13
PCR-RLFP	1	2	5	8
Cell culture and karyotyping	2	2	1	5
Real Time PCR	1	2	10	13
Cell Culture	1	4	4	9
Laboratory Animals	3	3	3	9
Electron Microscopy	1	-	-	1
HPLC	1	-	-	1
Bioinformatics	4	4	8	16
phylogenetic tree drawing	1	1	1	3
Application of Immunologic Methods	4	4	8	16
Primer Designing	2	2	2	6
Recombination	1	1	1	3
Cloning Methods	1	1	1	3
Stem Cell Culture	2	1	-	3
Gene Delivery Methods	2	1	1	4
Evaluation Of Protein expression	3	2	3	8

Educational Strategies, Methods and Techniques*

Student Assessment (Methods and Types)

- Formative
- Summative
- Comprehensive exam

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	*Medical information systems	0.5	0.5	1	9	17	26
02	informatics	2		2	34		34
03	Animal cell culture	2		2	34		34
04	Practical medical genetics		2	2		68	68
05	Laboratory animals	0.5	0.5	1	9	17	26
06	Cellular and molecular Biology	2		2	34		34
07	Medical genetics	2		2	34		34
08	Medical biochemistry	2		2	34		34
09	immunology	1	1	2	17	34	51
10	microbiology	1	1	2	17	34	51
11	Physiopathology of cardiovascular	4		4	68		68
12	Physiopathology of gastrointestinal	4		4	68		68
13	Semiology	1		1	17		17
14	Basic epidemiology	2		2	34		34
15	Basic pharmacology	2		2	34		34

Students should select 16 credits from table 1 in accordance to the regulations posed by the supervisor and post-graduate committee of the university.

* This course is necessary for all students

Table 2: Essential and compulsory courses (core)

Code	Course Title	Credits			Hours			prerequisites
		theoretical	practical	total	theoretical	practical	total	
16	Biochemistry of proteins	2		2	34		34	-
17	Medical molecular genetics	2		2	34		34	-
18	Cell signaling and system biology	2		2	34		34	-
19	Bioinformatics	0.5	1.5	2	9	51	60	-
20	Genetic engineering and molecular biotechnology	2	2	4	34	64	102	17
21	Target therapy	2		2	34		34	20
22	Molecular basic of diseases	4		4	68		68	-
23	Molecular diagnostic of diseases	2	2	4	34	64	102	17, 20
24	Molecular epidemiology	2		2	34		34	23
25	Dissertation	20						

Table 3: Non-core Courses (Electives)

Code	Course Title	Credits			Hours			Prerequisites
		theoretical	practical	total	theoretical	practical	total	
26	Bioethics	2		2	34		34	
27	Personal medicine	2		2	34		34	23
28	Mechanism of organ regenerative	2		2	34		34	
29	News in molecular medicine	2		2	34		34	17,20,21, 22
30	Protein engineering	2		2	34		34	
31	Nano biotechnology	2		2	34		34	
32	Passive defense	2		2	34		34	

Students should select 6 credits from table 3 in accordance to the regulations posed by the supervisor and post-graduate committee of the university.

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