Tehran University of Medical Sciences

IN THE NAME OF GOD

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

Medical Nanotechnology

Degree: Doctor of Philosophy (PhD)

Total Course Credits

- Core: 28
- Non-core (Electives): 6
- Dissertation: 24

Program Description

Nanomedicine, as an interdisciplinary and multidisciplinary field, is a combination of various sciences such as physics, chemistry, biology, pharmacy and medicine. Graduates of this field work on issues at the molecular and atomic basis (in sizes of 1 to 100 nm) to create methods for rapid and accurate diagnosis of diseases and to use intelligent delivery vehicles, artificial organs and medical devices such as nanorobots to improve the individual's life quality.

Outstanding features of nanotechnologyare diagnosis, treatment and prevention of diseases using nanodevices and nanostructures, engineered at the nanoscale. Tools used in nanomedicine range from drug delivery systems and nanobiosensorstonanorobots and nanoscaffolds. Nanomedicine depends on a great number of disciplines, including physics, engineering, chemistry, biology, and aims to improve the quality of life through enormous developments in health-care sectors.

Due to the increasing growth rate of science and technology in nanomedicine and investments in this field, it is predicted that the quality of human life will be substantially improved in near future. As a result, universities and higher education institutions are required to plan and implement programs for training and developing required human resources in various fields of nanomedicine. Therefore, training and educating skilled human resources majored in nanomedicine at PhD level is considered as the main mission of our educational program.

Admission Requirements

- Having a master degree (M.Sc.) in one of the fields of nanomedicine (medical nanotechnology), biophysics, physics (all disciplines), chemistry (all disciplines), chemistry engineering, biology (all disciplines), Engineering (all disciplines), textile engineering, biotechnology (all disciplines), immunology, artificial limbs, parasitology, biochemistry, occupational health engineering, medical entomology and vector control, human genetics, nutrition science, food science and technology, health sciences, nutrition , physiology, physiotherapy, mycology, microbiology, virology, environmental health engineering, medical physics, toxicology, hematology, medical engineering or bio-medical technology, awarded by one of national or foreign universities approved by the Ministry of Health and Medical Education. Similarly, M.D. in medicine, Pharm.D. in pharmacy, D.D.S. in dentistry, D.V.M. in veterinary or equivalent degrees are also accepted.
- 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:

- Keeping the physical, psychological, and occupational environment healthy
- Developing specific nanomedical skills including designing nano-delivery systems, lithography, cell and tissue culture, interpreting DLS, and STM, AFM, and electron microscopy results, and synthesizing metal and non-metal nanoparticles such as silver, gold, iron oxides, polymer nanofibers.
- Working with high-tech specialized equipment
- Acting professionally in nanomedical diagnostic
- Interpreting test results
- Conducting research at national and international levels
- Keeping up-to-date by self-education

Educational Strategies, Methods and Techniques Student Assessment (Methods and Types)

- Formative (quizzes and midterm exam)
- Summative (final exam)
- Comprehensive exam
- Methods of assessment: oral, written, observation, clinical competence assessments Portfolio assessment: Log book, test results, reports, articles, certificates, promotions, etc.

Ethical Considerations

*Note: The related document(s) can be found at http://hcmep.behdasht.gov.ir/

Table of the Courses

Table 1. Introductory courses

Code of the Course	Title of the Course	Total	Theoretical	Practical
1	Nanomaterials and Nanostructures	2	2	-
2	Methods of Nanostructure Fabrication	2	1	1
3	Characterization and Analysis Techniques of Nanostructures	2	1.5	0.5
4	Nanobiomedicine	3	3	-
5	Nanobiotechnology	2	2	-
6	Nanosafety	2	2	-

7	Medical Information Systems	1	0.5	0.5
8	Fundamentals of Physiopathology	2	2	-
	Total	16		

Table 2. Core courses

Code	Title of the Course	Total	Theoretical	Practical
9	Advanced nanobiotechnology	2	2	-
10	Advanced Nanobiomedicine	2	2	-
11	Designing Materials at Nanoscale	3	3	-
12	Drug Delivery Systems and Smart medicines	3	3	-
13	Methods of Research in Nano-Science and Technology	2	2	-
Total		12	-	-
14	Thesis	24		

Table 3. Non-Core Courses (Elective)*

Code	Title of the Course	Total	Theoretical	Practical
15	Virology and nanomedicine	2	2	-
16	Gene Therapy	2	2	-
17	Applications of Nanotechnology in Regenerative Medicine	3	2	1
18	Thin Films	3	3	-
19	Advanced Modeling at Nanoscale	2	1	1
20	Biological manipulation at	2	1.5	0.5
	Nanoscale			
21	Pharmacokinetics of Nanoparticles	1	1	0
	Total	15		

*6 credits from elective courses must be taken by the student

TEHRAN UNIVERSITY OF MEDICAL SCIENCES

Jamshid Hajati PhD
Secretariat of the Council for Education of Health and Basic Medical Sciences (Undergraduate and Postgraguate)

Seyed Mansour Razavi MD
Secretary of the Supreme Council for Medical Sciences Planning

Bagher Larijani MD
Deputy for Education
Ministry of Health and Medical Education