

In the Name of God
Islamic Republic of Iran
Ministry of Health and Medical Education
Deputy Ministry of Education

Doctor of Philosophy (Ph.D) in Environmental Health Engineering

Total Course Credits

- Core: 16 credits
- Non-core (Elective): 6 credits
- Dissertation: 18 credit
- Compensatory: 1 credits

Program Description

Environmental health engineering is one of the branches of health sciences for managing the external factors affecting human health. This is accomplished by identifying, monitoring, and assessing the interaction of environmental elements (water, soil, air, etc.) with human health and, eventually, planning, designing, and managing all the elements, including natural and human-made, to supply, maintain, and promote the human health and comfort. In this field, in addition to maintaining health and safety, aesthetic aspects are considered in proportion to the needs and expectations of the target population.

Accordingly, the most important goal of environmental health is to study environmental factors harmful to human health and diagnose, prevent, eliminate, and control the adverse effects caused by these factors. Environmental health strictly follows human health and public health as the main goal and indirectly pays attention to the quality of the environment and maintains the health of ecosystems. Therefore, the main branches of environmental health activities can be stated as follows:

- Supplying healthy food and water
- Analyzing mechanisms of environmentally transmitted diseases and how to prevent and control them
- Treating and disposing sewage
- Treating and disposing solid and toxic waste
- Decreasing air, water, soil, food, and noise pollution
- Providing healthy housing environment and public places

Terms and conditions of admission

In this program, MSc students in the disciplines listed below will be admitted under the general admission terms of Ministry of Health and Medical Education and the relevant specific conditions:

- Environmental health engineering (all disciplines in environmental health engineering)
- Environmental engineering
- Sanitary engineering
- Civil engineering (water and wastewater)
- Environmental management, planning and education
- Environment
- Natural resource engineering
- Environmental planning
- Environmental management
- Environmental education
- Analytical chemistry
- All disciplines of chemistry, chemical engineering, civil engineering
- Mechanical engineering
- Human ecology
- Environmental health engineering - waste management
- Environmental health engineering - operation and maintenance of urban health facilities
- Environmental health - environmental toxicology
- Environmental health engineering- air quality management
- Environmental health - radiation protection
- Civil engineering - environment
- Civil engineering - water and wastewater engineering

Note: Compliance with other specific conditions, including entrance examination and admission of the students is in accordance with the regulations approved and noticed by the Ministry of Health and Medical Education.

* To access the latest changes in the admitted degree, materials and their weights for the entrance exam per academic year, please refer to the PhD exam booklet for medical sciences related to that year.

Expected Competencies at the End of the Program

General Competencies

Table 1. Expected Competencies at the End of the Program

Competence	Description of professional tasks	Course code
Communication and interaction skills	<ul style="list-style-type: none"> Active participation in intra- and inter-department programs 	25 19 34
Management	<ul style="list-style-type: none"> Managing plans and programs related to environmental health in the educational, research, and executive areas with a systematic approach Planning for capacity building and development of various areas with environmental health activities Participating in management of policymaking and planning on national and international scales and using successful management models Participating in policymaking for projects related to environmental health in educational, research, and executive areas Analyzing managerial obstacles with systematic approach, planning, and policymaking to promote environmental health projects Planning for capacity building and development in various areas related to environmental health activities Monitoring of projects related to environmental health 	25 19 27 30 42
Training and consulting	<ul style="list-style-type: none"> Teaching various environmental health-related courses at Associate's, Bachelor's, Master's and doctoral levels Designing and implementing educational workshops related to educational needs of society Designing a new educational program to fulfill creative educational needs and designing of the new courses 	38 40 13 14 15 16
Research	<ul style="list-style-type: none"> Providing research projects related to needs of the society Guiding students in research fields such as projects and dissertation Consulting research projects in eliminating 	17 20 23 29 Project

	<p>obstacles and progress of research</p> <ul style="list-style-type: none"> • Preparing and publishing research articles with required standards • Participating in research activities on national and international scales • Criticizing the plans, research reports, and environmental health-related papers 	Dissertation
Policy-making and planning	<ul style="list-style-type: none"> • Participating in policymaking for plans related to environmental health in educational, research, and executive fields • Analyzing managerial obstacles with systematic approach, planning, and policymaking to promote environmental health projects • Using successful managerial models in similar works, plans, as well as modern and local policies • Planning in the field of capacity building and development in various fields related to environmental health activities 	22 37 25
Providing services to control environmental health	<ul style="list-style-type: none"> • Performing environmental health-related plans in procedural fields • Providing and implementing projects in specific fields of environmental health • Actively participating in group executive works • Getting involved in executive activities on national and international scales • Eliminating the problems with the existing plans and methods as well as providing modern and optimal solutions • Providing environmental health programs to manage the health status of various centers and places as well as environmental health monitoring plans • Developing instructions in environmental health affairs in various fields, such as water, soil, waste, and other related areas 	13 15 16 26 28 33 38 40

Specific Competencies and Skills

Table 2. Expected procedural skills

Course code	Skill	Minimum number of times required to do the activity to achieve mastery of the skill			
		Observation	Contribution	Done independantly	Total
13, 35, 36, 37	<ul style="list-style-type: none"> • Designing air pollution control systems and providing executive and managerial plans for air pollution control 	1	1	2	4
14, 38, 39, 40, 41, 42, 45	<ul style="list-style-type: none"> • Planning, monitoring, and managing waste and its elements (urban, hazardous, medical waste) • Designing, monitoring, and providing executive and managerial solutions related to energy recovery systems, waste incinerators, composting, sanitary landfills, leachate treatment, etc. 	1	1	2	4
15, 27, 28, 29, 31	<ul style="list-style-type: none"> • Design, planning, and managing conventional and innovative water treatment systems • Monitoring water resources and providing managerial solutions for planning water use management • Recognizing uncommon options to supply water needs and providing executive and managerial projects in this regard • Providing executive plans to manage water quality • Analyzing qualitative data of water • Designing suitable systems for water recirculation and reuse based on scientific principles and providing 	1	1	2	4

	solutions to water shortage management and improvement of reuse systems				
16, 32, 33	<ul style="list-style-type: none"> • Designing and developing conventional and advanced wastewater treatment systems • Designing and evaluating natural wastewater treatment systems • Designing, consulting, and monitoring sewage disposal projects 	1	1	2	4
17, 20, 23	<ul style="list-style-type: none"> • Analyzing data of studies by statistical software • Environmental pollution modeling • Planning in specialized areas of environmental health 	1	1	2	4
25, 34, 19	<ul style="list-style-type: none"> • Identifying, evaluating, and managing environmental health problems • Assessing environmental effects of various projects 	1	1	2	4
18	<ul style="list-style-type: none"> • Providing executive and managerial plans in quality control and soil monitoring 	1	1	2	4
21, 24	<ul style="list-style-type: none"> • Identifying and separating environmental microorganisms • Using methods based on biological knowledge in eliminating pollutants and solving environmental health problems 	1	1	2	4
26	<ul style="list-style-type: none"> • Identifying hazards and providing control solutions for food safety management and quality assurance 	1	1	2	4

Educational Strategies, Methods and Techniques

Executive strategies of the doctoral training program in the field of environmental health engineering should:

- Depend on local and national needs
- Emphasize on the prevention and health promotion
- Depend on solving health and environmental problems in the community
- Emphasize on training in real scale
- Consider training of multi-professional human resources
- Pay attention to new methods and techniques
- Be student-centered
- Pay attention to attitude issues and communication skills
- Emphasize on dynamic self-learning
- Be prospective

Student Assessment (Methods and Types)

Educational Strategies

The methods and types of assessments are included in each course description appropriately compatible with the structure and content of related objectives.

Ethical Considerations

Applicants are expected to:

- Comply with the bill of rights (1) of stakeholders
- Follow the safety regulations of staff and work environment
- Comply with dress code (2)
- Strictly observe the ethical rules (3) if working with animals
- Follow professionalism
- Protect resources and equipment to work under any circumstances
- Respect teachers, staff, peers, and other learners, and try to provide a friendly atmosphere in the workplace
- Observe social and professional ethical considerations in the critique of programs
- Observe the ethical points of research in performing field-related studies

Tables of the Courses

Table 3. Compensatory Courses

Course code	Course Title	Credits			Teaching Hours		
		Theory	Practical	Total	Theory	Practical	Total
1	Water and wastewater microbiology	1	1	2	17	34	51
2	Physical and chemical processes of water and wastewater	2	0	2	34	0	34
3	Integrated solid waste Management	2	0	2	34	0	34
4	Industrial wastewater management	2	0	2	34	0	34
5	Air pollution control	2	0	2	34	0	34
6	Design of water transmission and distribution systems	2	2	4	34	68	102
7	Water treatment plant design	2	0	2	34	0	34
8	Principles of hydrology	2	0	2	34	0	34
9	Water resource management	2	0	2	34	0	34
10	Biostatistics (1)	2	0	2	34	0	34
11	Vector control	2	0	2	34	0	34
12	Computer and its application	2	0	2	34	0	34
13	Medical Information systems**	0.5	0.5	1	8.5	16	25

** All the students must take this course unless they have already passed it.

Table 4. Core Courses

Course code	Title of the Course	Credits			Teaching Hours		
		Theory	Practical	Total	Theory	Practical	Total
1	Innovative technologies for air pollution control	2	0	2	34	0	34

2	Integrated solid waste management	2	0	2	34	0	34
3	Innovative methods for water treatment: processes and design	2	0	2	34	0	34
4	Innovative methods for wastewater treatment: processes and design	2	0	2	34	0	34
5	Applied statistics in environmental health research	1	1	2	17	34	51
6	Soil pollution control	2	0	2	34	0	34
7	Environmental health risk assessment and management	2	0	2	34	0	34
8	Modeling in environmental health sciences and engineering	1	1	2	17	34	51

Non-Core Courses

The student must choose 6 credits from non-core courses confirmed by the relative department. Non-core courses are classified into the following two groups:

1. Non-core courses A (water and sewage)
2. Non-core courses B (air and waste)

Non-core courses must be presented from the second semester onwards. Before presenting them, the student must choose from non-core courses A and B. Non-core courses will be selected with the help of the instructor and suggestion of the department. After confirming and registering non-core courses A and B, the student will only be allowed to select the courses listed in the same set.

Table 5-A. Non-Core Courses*
**water and wastewater discipline -PhD program for environmental health
engineering**

Course code	Title of the Course	Credits			Teaching Hours		
		Theory	Practical	Total	Theory	Practical	Total
1	Genetic and environmental biotechnology	2	0	2	34	0	34
2	Econometrics in environmental health	2	0	2	34	0	34
3	Applied computer programming in environmental health	1	1	2	17	34	51
4	Advanced environmental microbiology	2	0	2	34	0	34
5	planning and management in environmental health	2	0	2	34	0	34
6	Food safety analysis and management in food processes	2	0	2	34	0	34
7	Water quality monitoring and management	2	0	2	34	0	34
8	Non-conventional systems for water supply and transmission	2	0	2	34	0	34
9	statistical methods for water quality analysis	2	0	2	34	0	34
10	Pollutants management in coastal area and seas	2	0	2	34	0	34
11	Water reuse and recycling	2	0	2	34	0	34
12	Natural wastewater treatment	2	0	2	34	0	34
13	Sludge processing and disposal	2	0	2	34	0	34
14	Environmental health impact assessment (EHIA)	2	0	2	34	0	34

* Students must pass 6 credits based on their dissertation topics, and approval of their thesis adviser and postgraduate education council.

Table 5-B. Non-Core Courses*
air and solid waste discipline - PhD program for environmental health engineering

Course code	Title of the Course	Credits			Teaching Hours		
		Theory	Practical	Total	Theory	Practical	Total
1	Genetic and environmental biotechnology	2	0	2	34		34
2	Econometrics in environmental health	2	0	2	34		34
3	Applied computer programing in environmental health	1	1	2	17	34	51
4	Advanced environmental microbiology	2	0	2	34		34
5	planning and management in environmental health	2	0	2	34		34
6	Food safety analysis and management in food processes	2	0	2	34		34
7	Air pollution from vehicles and its control	2	0	2	34		34
8	Air quality monitoring	2	0	2	34		34
9	Planning of Urban air pollution control	2	0	2	34		34
10	Compost technology: Process and design	2	0	2	34		34
11	Leachate control and treatment	2	0	2	34		34
12	Landfill of wastes: Processes and design	2	0	2	34		34
13	Material and energy recovery	2	0	2	34		34
14	Hazardous waste management	2	0	2	34		34
15	Behavior of pollutants in the environment	2	0	2	34		34
16	Environmental health impact assessment (EHIA)	2	0	2	34		34
17	Technology of Incinerators	2	0	2	34		34

* Students must pass 6 credits based on their dissertation topics, and approval of their thesis adviser and postgraduate education council.