

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

**Master of Science in Environmental Health Engineering**

**Total Course Credits**

- Core: 22 credits
- Non-core (Elective): 4 credits
- Thesis: 6 credits
- Compensatory: 16 credits

**Program Description**

Environmental health engineering focuses on identifying, evaluating, and rectifying environmental problems that have a discernible impact on public health. It is concerned with how both natural and human-made phenomena affect human health by seeking the impact of physical, chemical and biological factors of the environment on humans. The central idea is that many threats to human health are related to the environment, and the most effective way to alleviate the threat is to prevent or remediate the underlying environmental problem. Degrees in environmental health engineering are offered at the bachelor's, master's and doctoral levels.

Students at the master's level often choose a specialty, such as water, wastewater, air pollution and solid waste management. Most programs require students to present a thesis project before graduating.

**Admission Requirements**

- Applicants to Master of Science in environmental health engineering programs need to have excellent skills in reasoning, mathematics, science and research.

- The applicants should participate in an entrance exam, administered by the ministry of health, before they could enter the course which is formulated based on educational rules and regulations of the Development Council of Iran’s Ministry of Health.
- A Bachelor’s degree in environmental health engineering, environmental engineering, occupational health engineering, health, safety, and environmental engineering, health services management, pure chemistry, applied chemistry, biology, biotechnology, soil sciences and engineering, geology, water sciences and engineering, physics, chemical engineering, civil engineering, mechanical engineering and laboratory medicine.
- Written exam is according to the following table:

**Table 1. Materials of the Entrance Exam**

<b>Materials of the Entrance Exam</b>	<b>Weight</b>
Principles of environmental health	2
Air pollution	1
Water and wastewater treatment	1
Chemistry and microbiology of water and wastewater	1
Hazardous and toxic solid waste management	2
General English	2

### **Expected Competencies at the End of the Program**

**Table 2. Expected Competencies at the End of the Program**

<b>Competence</b>	<b>Description of professional tasks</b>	<b>Course code</b>
Communication and interaction skills, Inter-sectoral coordination	<ul style="list-style-type: none"> <li>• Communication with public and private sectors *</li> <li>• Coordination amongst different sectors</li> </ul>	19, 26
Management skills	<ul style="list-style-type: none"> <li>• Planning, management, and monitoring of issues</li> </ul>	14, 15, 21, 26, 28, 25,

	<p>related to water, wastewater, air and solid waste in public and private organizations</p> <ul style="list-style-type: none"> <li>● Investigation and decision making in case of programs and their implementation considering technical and economic aspects</li> <li>● Evaluation of the quality of the provided services</li> </ul>	26
Education, consulting and designing skills	<ul style="list-style-type: none"> <li>● Participation in educating lower degrees of environmental health engineering in one of the branches such as water, wastewater, air pollution and solid waste in the Universities.</li> <li>● Holding workshops on environmental health topics</li> <li>● Providing technical and consulting services for public and private sectors</li> <li>● Designing of control and monitoring systems related to water and wastewater, solid waste, as well as air pollution</li> <li>● Consulting about establishment of standard laboratories for environmental health</li> </ul>	10, 11, 12, 13, 19
Research skill	<ul style="list-style-type: none"> <li>● Proposal and implementation of research programs in cooperation with Universities, research and executive centers, on any of the environmental health issues (water, wastewater, air pollution and solid waste) considering global, regional, national, provincial and local needs</li> </ul>	9, 27

<p>Entrepreneurship</p>	<ul style="list-style-type: none"> <li>• Design and providing technical and consulting services, executive affairs, and services for monitoring and controlling environmental pollutants, such as establishing trusted environmental laboratories in the field of identifying and analyzing urban environmental pollutants (urban, medical, industrial, agricultural, hazardous, , and nuclear)</li> <li>• Providing routine laboratory services through contracts for experiments.</li> </ul>	<p>16, 17, 20</p>
<p>Hazard analysis and assessment</p>	<ul style="list-style-type: none"> <li>• Identification of environmental risk factors and their correlation with diseases</li> </ul>	
<p>Technical services</p>	<ul style="list-style-type: none"> <li>• Providing services in environmental health engineering laboratories on water, wastewater, air</li> <li>• Identification of environmental pollutants (municipal, medical, industrial, agricultural, environmental and nuclear toxic substances)</li> <li>• Conducting environmental experiments based on the contents mentioned in skills table</li> <li>• Evaluation and analysis of concerns related to environmental health</li> </ul>	<p>10, 11, 13, 19</p>

\* Public and private sectors may include medical sciences Universities, environmental health research centers and laboratories, health centers, hospitals, department of environment, municipalities, ministry of industry, mine and trade, ministry of petroleum, ministry of energy, industrial parks organization, and atomic energy association.

**Table 3. Expected Procedural Skills at the End of the Program**

Course Code	Skill	Minimum number of times required to do the activity to achieve mastery of the skill			
		Observation	cooperation	Done Independently	Total
31, 10	<ul style="list-style-type: none"> <li>Designing air pollution control systems and proposing applicable projects for the control of pollutants in indoor and outdoor environments</li> </ul>	1	1	2	4
13, 23	<ul style="list-style-type: none"> <li>Planning, monitoring, overseeing and management of categories of solid waste (municipal, hazardous, medical, etc.)</li> <li>Designing, monitoring, overseeing and proposing executive and managerial solutions related to energy recovery from waste, incineration, composting, sanitary landfill, leachate treatment, etc.</li> </ul>	1	1	2	4
12, 28, 14, 21	<ul style="list-style-type: none"> <li>Proposing applicable projects for management and control of water quality</li> <li>Designing of water treatment systems, operation and process control within water treatment plants</li> <li>Overseeing and implementation of drinking water safety plan</li> <li>Designing efficient systems for water reuse based on scientific principles along with</li> </ul>	2	2	2	6

	proposing solution for management of water shortage as well as optimizing current reuse systems				
11, 22, 15	<ul style="list-style-type: none"> <li>• Designing of conventional and advanced wastewater treatment systems</li> <li>• Designing and evaluation of natural systems for wastewater treatment</li> <li>• Designing and management of industrial wastewater treatment systems</li> </ul>	1	1	2	4
16	<ul style="list-style-type: none"> <li>• Environmental and health impact assessment of various projects along with proposing solution for reducing adverse effects, management and monitoring of impacts</li> </ul>	1	1	2	4
17	<ul style="list-style-type: none"> <li>• Application of advanced laboratory instruments and equipment in pollutants analysis</li> </ul>	2	2	2	6
9, 19	<ul style="list-style-type: none"> <li>• Investigation of environmental health issues in organizations, offices, and engineering consultancy</li> <li>• Application of various software related to the environmental health such as DOE, etc.</li> <li>• Writing proposal, citation using corresponded software, and paper writing</li> </ul>	2	2	2	6
27, 29	<ul style="list-style-type: none"> <li>• Modeling in environmental health contexts</li> </ul>	2	2	2	6

	<ul style="list-style-type: none"> <li>• Data analysis of research studies by using statistical software</li> </ul>				
32	<ul style="list-style-type: none"> <li>• Providing solutions for quality control and safety management of foodstuffs</li> </ul>	2	2	2	6
20	<ul style="list-style-type: none"> <li>• Sampling of environmental pollutants</li> </ul>	2	2	2	6

## **Educational Strategies**

- Task-based education
- A combination of student- and teacher-based education
- Problem-oriented education
- Community-oriented education
- Subject-based education
- Lab-based education

## **Educational Methods and Techniques:**

In this course, various educational methods and techniques are used:

- Discussion in small groups, workshops, journal clubs and reading groups
- Practical actions
- Contribution in educating the lower degrees
- Self-education
- Other techniques of education regarding the educational requirements and objectives

## **Student Assessment (Methods and Types)**

### **1. Methods of assessment:**

Written, oral and interactive computer exam.

- Objective structured field examination (OSFE)
- Direct observation of procedural skills (DOPS)
- Project-based assessment

Portfolio assessment including Log book evaluation, results of the completed exams, certificates, etc.

### **2. Types of assessments:**

Quizzes and midterm exams

## Ethical Considerations

Applicants are expected to:

1. Strictly adhere to the patient bill of rights.
2. Make provisions for the biosafety of the patients, staff and workplace.
3. Strictly comply with the dress code.
4. Carefully follow the ethical code with respect to working with animals.
5. Protect resources and equipment used under any circumstances.
6. Be respectful towards the faculty, staff, peers and other learners engaging in creating a sincere and respectful atmosphere in the workplace.
7. Have considerations for the social and professional ethics in making criticism against others.
8. Follow the code of ethics in research.
9. Follow the occupational and professional ethics, in addition to professionalism.

\* For items 1, 2, 3 and 4, the related document(s) can be found at <http://hcmep.behdasht.gov.ir/>.

## Tables of the Courses

**Table 4. Compensatory Courses**

Course code	Course Title	Credits			Teaching Hours		
		Theory	Practical	Total	Theory	Practical	Total
1	Medical information systems*	0.5	0.5	1	9	17	26
2	Processes and operations in environmental health	2	-	2	34	-	34
3	English for the students of environmental health engineering	2	-	2	34	-	34
4	Environmental chemistry	2	1	1	17	34	51
5	Environmental microbiology	2	1	1	17	34	51
6	Hydraulic and fluids mechanics	2	1	3	34	51	85
7	Principles of environmental health (1) **	2	-	2	34	-	34
8	Principles of environmental health (2)***	2	-	2	34	-	34

Sum	16
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The students who have not passed the compensatory courses in their previous degrees (Associate and Bachelor's degrees) must pass all or some of the compensatory courses as determined by department of education and approved by postgraduate education council.

\*This course is obligatory for all the MSc students.

\*\* The syllabus of this course is related to environmental ecology, air pollution, radiation hygiene and protection, waste generalities and sanitary control of food preparation, distribution and storage sites in BSc courses.

\*\*\* The syllabus of this course is related to water and wastewater treatment in BSc Courses.

**Table 5. Core Courses**

Course code	Title of the Course	Credits			Teaching Hours		
		Theory	Practical	Total	Theory	Practical	Total
9	Research methodology in environmental health engineering	2	-	2	34	-	34
10	Air pollution control	2	-	2	34	-	34
11	Wastewater treatment plant design	2	-	2	34	-	34
12	Water treatment plant design	2	-	2	34	-	34
13	Design and engineering principles of solid waste systems	2	-	2	34	-	34
14	Drinking water safety plan	2	-	2	34	-	34
15	Industrial wastewater management	2	-	2	34	-	34
16	Environmental impact assessment	2	-	2	34	-	34
17	Application of advanced equipment in environmental pollutants analysis	1	1	2	17	34	51
18	Environmental epidemiology	2	-	2	34	-	34
19	Internship	-	2	2	-	102	102
Sum		22					

**Table 6. Non-Core Courses\*(elective)**

Course code	Title of the Course	Credits			Teaching Hours		
		Theory	Practical	Total	Theory	Practical	Total
20	Sampling methods from environment and resources	2	-	2	34	-	34
21	Management of water reuse and recycling	2	-	2	34	-	34
22	Natural systems for wastewater treatment	2	-	2	34	-	34
23	Materials and energy recovery	2	-	2	34	-	34
24	Environmental toxicology	2	-	2	34	-	34
25	Engineering economics	2	-	2	34	-	34
26	Policy making and planning in environmental Health management	2	-	2	34	-	34
27	Application of statistical methods in environmental health	2	-	2	34	-	34
28	Management of water resource development	2	-	2	34	-	34
29	Principles and concepts of modeling in environmental health	1.5	0.5	2	34	-	34
30	Climate change and health	2	-	2	34	-	34
31	Impacts of air pollution in indoor and outdoor environments	2	-	2	34	-	34
32	Foodstuffs hygiene and Safety	2	-	2	34	-	34

\* Students must pass 4 credits from non-core courses based on the approval of their adviser as well as the department.