

**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
(Operation and Maintenance of Urban Health Facilities)**

Total Course Credits

- Core: 21 credits
- Non-core (Elective): 5 credits
- Thesis: 6 credits

Program Description

Operation and maintenance of urban health facilities is a branch of environmental health engineering that can be defined as the integration of the principles of science and engineering to optimize performance, efficiency and lifetime of urban health facilities such as water and wastewater treatment plants, sanitary landfill sites, composting plants, incinerators, etc. through applying the best practices in start-up, operation, inspection, surveillance, continuous monitoring of input and output, preventive maintenance and fixing any sort of mechanical, plumbing or electrical devices of the facilities. In the past, academic education and research in operation and maintenance in urban health facilities were performed as a part of some other fields, especially environmental health engineering. The MSc program, as the first academic program of operation and maintenance in urban health facilities in Iran, was developed in 2013.

The main scope of this program can be categorized as follows: (1) environmental chemistry, (2) environmental microbiology, (3) operation and maintenance of water supply facilities, (4) operation and maintenance of wastewater management facilities, (5) operation and maintenance of solid waste management facilities, (6) operation and maintenance of urban health facilities in emergencies and disasters, (7) environmental health risk assessment and management, (8) ecological risk assessment and management and, (9) legal aspects related to operation and maintenance in urban health facilities. The MSc program in operation and maintenance of urban health facilities intends to offer opportunities for improving performance and efficiency of urban health facilities through the

research done by the program graduates. The MSc graduates are prepared to work for private companies and governmental agencies as instructors, researchers, consultants, managers or professional service providers in various areas of operation and maintenance in urban health facilities.

The vision of the MSc program is to be the most preeminent program in the field of operation and maintenance of urban health facilities at national and international levels to promote environmental health across the country through professionalism and research.

The mission of the MSc program is to train graduates who are competent in the field of operation and maintenance of urban health facilities so that they appreciate the moral and ethical impacts of their professional work, advance technical and scientific knowledge of operation and maintenance in urban health facilities, and develop professional services in operation and maintenance of urban health facilities for the benefit of the country.

Admission Requirement

A Bachelor's degree is required in environmental health engineering, environmental engineering, water and wastewater engineering, water engineering, electrical engineering, mechanical engineering, chemistry, chemical engineering or civil engineering.

Table 1. Materials of the Entrance Exam

Materials of the Entrance Exam	Weight
Principles of environmental health including foodstuffs hygiene, residential and public environments sanitation and health, noise pollution, radiation protection, environmental impact assessment and vector control	2
Principles of fluid mechanics and hydraulics	1
Water transmission and distribution network Wastewater collection systems	1
Operations and processes in water treatment	1
Operations and processes in wastewater treatment	1
Solid waste management	1
Principles of management	1
Environmental chemistry and microbiology	2
General English language	2

Note: To access the latest updates, see guide booklet of discontinuous master's exam in medical sciences.

Expected Competencies at the End of the Program

General Competencies*

General competencies expected from the graduates include:

- Communication skills
- Education
- Project management
- Computer Driving License or International Computer Driving License (ICDL) skills
- Use of specialized software tools in *the* related field
- Advance search in databases
- Development of the safety procedures (Biosafety)
- Critical evaluation of instructions, relevant rules and regulations

- Writing and critical evaluation of scientific papers
- Principles of management (policy making, planning, organizing, implementing, coordination, monitoring and supervision as well as assessment)
- Preparation of professional evaluation checklists
- Research and the scientific writing

Specific expected competencies and skills

At the end of the program, graduates are expected to have the following skills:

- Taking air, water, wastewater, soil, sludge and solid waste samples for the required experiments
- Disinfection of water and wastewater
- Removal of physical, chemical and biological contaminants from water, wastewater and solid waste
- Identification and detection of physical, chemical and biological constituents in water, wastewater and solid waste
- Conducting bioassay for assessment of water and wastewater toxicity
- Disinfection in wastewater treatment plant
- Identification of problems related to sedimentation such as filamentous and foaming bacteria domination in wastewater treatment plants
- Conducting sludge treatment experiments
- Identification of problems related to hydraulic, toxic and organic shocks in wastewater treatment plant
- Application and calibration of analytical instruments such as gas chromatograph (GC), high performance liquid chromatograph (HPLC), atomic absorption spectrophotometer (AAS), ion chromatograph (IC), spectrometers, flame photometer, etc.
- Determination of oxygen uptake rate (OUR)
- Consideration about biosafety standards
- Technical evaluation of urban health facilities
- Evaluation of parameters related to the quality control of facilities
- Detecting and measuring quality parameters in environmental samples

Educational Strategies, Methods and Techniques

This program is based on the following strategies:

- Task-based learning
- A combination of student- and teacher-based learning
- Problem-based learning
- Subject-directed learning
- Field-based education
- Evidence-based learning
- Community-oriented learning

Educational Methods and Techniques

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

- Inter- disciplinary and -Universities conferences and seminars
- Discussion in small groups, workshops, journal clubs and case presentation
- Applying distance education
- Contribution in educating the lower degrees
- Self-education, self-study
- Other training methods and techniques according to the requirements and objectives

Student Assessment (Methods and types)

Methods of assessment:

- Oral, written, computer interactive test, OSFE, and 360° exam system
- Portfolio evaluation including evaluation of Log book, results of performed tests, encouragements and reminders, certificates, etc.)

- Types of assessments:

Quizzes, midterm and final 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. Protect resources and equipment used under any circumstances.
5. Be respectful towards the faculty, staff, peers and other learners engaging in creating a sincere and respectful atmosphere in the workplace.
6. Have considerations for the social and professional ethics in making criticism against others.
7. Follow the code of ethics in research.
8. Follow the occupational and professional ethics, in addition to professionalism.

Tables of the Courses

Table 2. Compensatory Courses

Course Code	Title of the Course	Credits			Teaching Hours			Prerequisite or Concurrent Courses
		Theoretical	Practical	Total	Theoretical	Practical	Total	
1	Water transmission and distribution system	1	1	2	17	51	68	-
2	Municipal wastewater and storm water Collection System	1	1	2	17	51	68	-
3	English for the students of environmental health engineering	2	-	2	34	-	34	-
4	Water treatment	2	-	2	34	-	34	-
5	Municipal wastewater treatment	2	-	2	34	-	34	8
6	Industrial wastewater treatment	1	-	1	17	-	17	8
7	Environmental chemistry	1	1	2	17	34	51	-
8	Environmental microbiology	1	1	2	17	34	51	-
9	Medical information systems*	0.5	0.5	1	9	17	26	-
10	Educational methods and techniques	2	-	2	34	-	34	-
11	Environmental impact assessment	2	-	2	34	-	34	-
12	Municipal and industrial solid waste	2	-	2	34	-	34	-
13	Applied mathematics and calculations in urban health facilities	1	-	1	17	-	17	-
14	Policies, acts and regulations in environmental health engineering	1	-	1	17	-	17	-
15	Engineering economics	2	-	2	34	-	34	-

* This course is obligatory for all the M.Sc students.

* 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 (maximum 24 Credits).

Table 3. Core Courses

Course code	Title of the Course	Credits			Teaching Hours			Prerequisite or Concurrent Courses
		Theoretical	Practical	Total	Theoretical	Practical	Total	
16	Health impact assessment	2	-	2	34	-	34	11
17	Principles of electricity and its applications in water and wastewater treatment plants	1	-	1	17	-	17	-
18	Principles of electronics and Its applications in telecommunications and automation	1	-	1	17	-	17	17
19	Water and wastewater treatment plant hydraulics	1	-	1	17	-	17	4, 5 and 6
20	Instrumental analytical methods in control of urban health facilities	1	1	2	17	34	51	7
21	Operation and maintenance of drinking water supply facilities	1	1	2	17	34	51	1 and 4
22	Operation and maintenance of wastewater collection systems, treatment and reuse facilities	1	1	2	17	34	51	2 and 5
23	Operation and maintenance of industrial wastewater treatment plants	1	1	2	17	34	51	6
24	Operation and maintenance of sludge treatment and disposal systems in water and wastewater treatment plants	1	1	2	17	34	51	4, 5 and 6

25	Operation and maintenance of water and wastewater electromechanical facilities	1	1	2	17	34	51	17 and 18
26	Management, planning, operation and maintenance of disposal facilities for hazardous health-care and radioactive wastes	1	-	1	17	-	17	12
27	Management of operation and maintenance for solid waste recycling and disposal facilities	1	1	2	17	34	51	12
28	Internship	-	1	1	-	51	51	-

Table 4. None-Core Courses

Course code	Title of the Course	Credits			Teaching Hours			Prerequisite or Concurrent Courses
		Theoretical	Practical	Total	Theoretical	Practical	Total	
29	Warehouse management for materials, equipment and spare parts in urban health facilities	1	-	1	17	-	17	-
30	Management and control of water and wastewater projects	0.5	0.5	1	9	17	26	-
31	Integrated management systems	1	-	1	17	-	17	-
32	Management, organization and administration of operation and maintenance	1	-	1	17	-	17	-
33	Drilling, equipping and operation of wells	1	-	1	17	-	17	-
34	Principles and procedures of	1	-	1	17	-	17	4, 5 and 6

	sludge treatment							
35	Principles of emergency response in urban health facilities	1	-	1	17	-	17	4, 5 and 6
36	Principles, criteria and regulations of safety in systems	1	-	1	17	-	17	-
37	Operation and maintenance of water and wastewater facilities in small communities	1	-	1	17	-	17	4, 5 and 6
38	Principles of wastewater recycling and reuse	2	-	2	34	-	34	-
39	Computer-based statistical and modeling methods	1	1	2	17	34	51	-
40	Management of solid waste disposal sites and landfill facilities	1	-	1	17	-	17	12
41	Urban health facilities and emergency preparedness	1	-	1	17	-	17	-
42	Planning of preservation and maintenance (PM)	2	-	2	34	-	34	-
43	Design and conducting of the pumping Stations	1	-	1	17	-	17	-

* The student must pass 5 credits of the above table in accordance with the thesis topic, the approval of the supervisor and the graduate council of the university.