



Department of Sanitary Engineering

The department of Sanitary Engineering offers the following programs:

1. Graduate Diplomas

1.1 Professional Diploma in Sanitary Engineering

The student must complete 24 credit hours. The student must choose his/her courses from the list of courses that are specified as “Diploma courses”.

1.2 Specialized Graduate Diploma in Sanitary Engineering

The student must complete 30 credit hours.

The student must choose his/her courses from the list of courses that are specified as “Diploma courses”.

2. Master Degrees

2.1 Master of Engineering in Sanitary Engineering

The student must complete 30 credit hours in the form of courses and an additional 3 credit hours in the form of a scientific report.

The student must choose his/her courses from the list of courses that are specified as “Master courses”. The student is allowed to choose 2 courses from another major.

2.2 Master of Science in Sanitary Engineering

The student must complete 24 credit hours in the form of courses and an additional 8 credit hours in the form of a thesis.

The student must choose his/her courses from the list of courses that are specified as “Master courses”. The student is allowed to choose 2 courses from another major.

3. Doctor of Philosophy- Ph.D. Degree

3.1 Doctor of Philosophy in Sanitary Engineering

The student must complete 18 credit hours in the form of courses and an additional 24 credit hours in the form of a dissertation.

The student has the right to choose three courses from another major.



List of Diploma, Master and Ph.D. courses

No.	Course Code	Course Name	Credit Hours	Exam Duration
1	0 7 07 611	Operation and Maintenance of Waste Water Treatment Plants	3	3
2	0 7 07 612	Construction and Maintenance of Sewer Systems	3	3
3	0 7 07 613	Waste Water Reuse for Agricultural Irrigation	3	3
4	0 7 07 614	Solid Waste Management	3	3
5	0 7 07 615	Sludge Treatment	3	3
6	0 7 07 616	Design of Wastewater Treatment Plants	3	3
7	0 7 07 617	Advanced Methods of Water Treatment	3	3
8	0 7 07 618	Unit Operation	3	3
9	0 7 07 619	Industrial Wastewater Control	3	3
10	0 7 07 621	Water Purification	3	3
11	0 7 07 622	Potable Water Distribution Systems	3	3
12	0 7 07 623	Wastewater Collection Systems	3	3
13	0 7 07 624	Wastewater Treatment	3	3
14	0 7 07 625	Wastewater Engineering in Rural Areas	3	3
15	0 7 07 626	Unit Operation	3	3
16	0 7 07 627	Economical Methods of Wastewater Treatment	3	3
17	0 7 07 628	Water Bodies Pollution Control	3	3
18	0 7 07 629	Solid Wastes	3	3
19	0 7 07 630	Industrial Wastewater Control	3	3
20	0 7 07 631	Principles of Plumbing	3	3
21	0 7 07 711	Water Purification Engineering	3	3
22	0 7 07 712	Potable Water Distribution and Storage	3	3
23	0 7 07 713	Sewer Systems	3	3
24	0 7 07 714	Wastewater Treatment Processes	3	3
25	0 7 07 715	Rural Sanitation	3	3
26	0 7 07 716	Wastewater Reuse	3	3
27	0 7 07 717	Water and Wastewater Analysis	3	3
28	0 7 07 718	Water Resources Engineering	3	3
29	0 7 07 719	Unit Operation (I)	3	3
30	0 7 07 120	Unit Operation (II)	3	3



31	0 7 07 721	Storm Water Collection	3	3
32	0 7 07 722	Industrial Wastewater Treatment	3	3
33	0 7 07 723	Surface Water Pollution Control	3	3
34	0 7 07 724	Plumbing	3	3
35	0 7 07 725	Solid Wastes Control	3	3
36	0 7 07 726	Economics of Water and Wastewater Projects	3	3
37	0 7 07 727	Waste Recycle Processes	3	3
38	0 7 07 728	Hazard Wastes Control	3	3
39	0 7 07 729	Sanitary Chemistry and Microbiology	3	3
40	0 7 07 811	Potable Water Engineering	3	3
41	0 7 07 812	Wastewater Engineering	3	3
42	0 7 07 813	Economy of Water and Wastewater Projects	3	3
43	0 7 07 814	Safe Reuse of Wastewater	3	3
44	0 7 07 815	Environmental Engineering	3	3
45	0 7 07 816	Sanitary Chemistry	3	3
46	0 7 07 817	Sanitary Microbiology	3	3
47	0 7 07 601	Diploma Project in Sanitary Engineering	3	Presentation
48	0 7 07 701	Master of Engineering Report in Sanitary Engineering	3	Defense
49	0 7 07 705	Master of Science Thesis in Sanitary Engineering	8	Defense
50	0 7 07 801	Doctor of Philosophy Dissertation in Sanitary Engineering	24	Defense

Description of Courses for Graduate Programs (Diploma- Master- Doctor of Philosophy)

07 07 611 Operation and Maintenance of Wastewater Treatment Plants

Introduction and briefing of physical, chemical and biological wastewater treatment processes, Primary sedimentation facilities, Biological treatment units facilities, Chlorination facility, Sludge treatment, and disposal methods, Operating, maintenance and troubleshooting.

07 07 612 Construction and Maintenance of Sewer System

Sewer materials, Built in place sewers, Excavation techniques, Sheeting and bracing, Pipe laying and joints, Maintenance of sewers, Sewer repairs, Sewer gases, Corrosion of sewers, Construction and maintenance of manholes, street inlets, collection sumps and pump stations, Protection and safety of labors.



07 07 613 Wastewater Reuse for Agricultural Irrigation

Characteristics of wastewater from domestic, irrigation drains and industries, Efficiency of wastewater treatment on physical, chemical, and microbiological characteristics, Effect of wastewater reuse on environment, public health, soil and crops, Methods of irrigation and drainage, Environmental impact assessment.

07 07 614 Solid Wastes Management

Collection of garbage, Transportation, Classification of refuse, Sanitary landfills, Reuse of different constituents, Composting, Environmental impact assessment.

07 07 615 Sludge Treatment

Characteristics and quantities of sludge wasted from wastewater treatment, Sludge pumping, Sludge treatment, Anaerobic sludge digestion, Design, operation and maintenance of digesters, Startup of digesters, Aerobic digestion, Sludge thickening, pressing, vacuum filtration and drying, Land disposal, Incineration.

07 07 716 Design of Wastewater Treatment Plants

Characteristics and flow rates of wastewater, domestic, industrials, and storm water, Preliminary and primary treatment, Biological treatment, Trickling filters, Activated sludge process, Biological towers, Anaerobic biological treatment, sludge treatment and disposal, Advanced wastewater treatment, operation and maintenance of treatment units.

07 07 617 Advanced Methods of Water Treatment

Water characteristics, surface water, ground water and treated wastewater effluent, organic and inorganic contaminants, chemical sedimentation, Iron and manganese removal, Aeration, Filtration, Absorption, Hydro dialysis, Softening, Reverse osmosis.

07 07 618 Unit Operation

Chemical coagulation in water and wastewater treatment, Coagulants, Removal of organic and inorganic contaminants, operation and maintenance of water purification plants and wastewater treatment units, Chemical and microbiological tests needed in water and wastewater processes.

07 07 619 Industrial Wastewater Treatment

Water quality and rates needed for industries, Characteristics of different industrial wastewaters, Physical, Chemical, and biological treatment processes, wastewater recycle Environmental impact assessment of industrial wastewater disposal.

07 07 621 Water Purification



Quality of raw water, Water treatment plants, Plain and chemical sedimentation, Filtration, Disinfections, Advanced treatment processes, Ground water treatment.

07 07 622 Potable Water Distribution Systems

Storage of water, Ground and elevated storage, Equalization between consumption rates and storage, High lift pumps, Distribution networks, Construction and maintenance of distribution networks.

07 07 623 Wastewater Collection Systems

Domestic, storm and industrial wastewater, Design of gravity systems, Sewer appurtenances, Maintenance of sewer systems, Safety, Pumping stations.

07 07 624 Wastewater Treatment

Wastewater characteristics, Aerobic and anaerobic processes, Preliminary treatment, Primary treatment, Secondary treatment, Tertiary treatment, Biological filtration, Activated sludge, Stabilization ponds, Aerated lagoons.

07 07 625 Wastewater Engineering in Rural Areas

Characteristics of wastewater in rural areas, Wastewater treatment methods in rural areas, Disposal and reuse, Biogas.

07 07 626 Unit Operation

Chemical treatment of water and wastewater, Biological treatment of water and wastewater, Sedimentation, Filtration, Adsorption, Reverse osmosis, Distillation.

07 07 627 Economical Methods of Wastewater Treatment

Natural treatment methods, Stabilization ponds, Aerated lagoons, Wetlands, Land treatment.

07 07 628 Water Bodies Pollution Control

Nature of water bodies, Impacts of wastes disposal in water bodies, Treatment and recovery of polluted water bodies, Self-purification.

07 07 629 Solid Wastes

Solid wastes sources, Collection, transportation and classification, Sanitary landfill, Composting, Recycling.

07 07 630 Industrial Wastewater Control

Characteristics of industrial wastewater, Treatment of industrial wastewater from different sources, Recycling and water conservation.



07 07 631 Principles of Plumbing

Water supply pipes and sanitary installations in different buildings, Design of interior water systems, Heating, Interior drainage systems, Vent systems, Fire protection systems in buildings

07 07 711 Water Purification Engineering

Water resources, Potability of water, Drinking water standards, Ground water, Surface water collection works, Low lift units, Sedimentation processes, Water filtration, Water disinfection.

07 07 712 Potable Water Distribution and Storage

Storage of water, Ground and elevated storage, Domestic water tanks, Pumping water systems, Design of distribution network, Network maintenance, Maintenance of storage tanks.

07 07 713 Sewer Systems

Collection methods of domestic sewage, Industrial wastes, Storm water types of collection sewers, Design of storm water sewer system, Design of domestic sewers, Primary studies of collection systems, Pipelines construction, Appurtenances of sewer systems, Collection sumps, Pump stations and rising mains.

07 07 714 Wastewater Treatment Processes

Wastewater characteristics, Organic elements cycle in nature, Aerobic oxidation, Anaerobic oxidation, Wastewater tests, BOD, COD, Domestic sewage sampling, Preliminary treatment, Primary treatment, Chemical sedimentation, Biological treatment, Trickling filters, Activated sludge, Stabilization ponds, Aerated lagoons, Reuse of wastewater.

07 07 715 Rural Sanitation

Wastes collection, Septic tank, Effluent disposal, Small bore sewer system, Night soil collection and disposal, Biogas.

07 07 716 Wastewater Reuse

Collection methods, Simplified and economic treatment methods, Reuse of wastewater, Land treatment, Wastewater reuse applications, Standards.

07 07 717 Water and Wastewater Analysis

Chemical analysis, Microbiological analysis, Advanced chemical methods, Lakes and marine water analysis, Special topics on public health.



07 07 718 Water Resources Engineering

Rain water, Ground water, Surface water, Characteristics of different water resources, Measurement of water discharges of channels and pipelines, Alternative resources of fresh water, Control of losses in water uses in domestic, industrial and irrigation purposes.

07 07 719 Unit Operation (I)

Unit operation, Physical & chemical processes, Sedimentation, Chemical sedimentation, Filtration, Adsorption, Disinfection, Reverse osmosis.

07 07 720 Unit Operation (II)

Biological process, Role of microorganisms, Aerobic oxidation, Anaerobic oxidation, Suspended growth methods, Attached growth methods, Sludge processes.

07 07 721 Storm Water Collection

Measurement of precipitation, Types of rain gauges, Measurement of snow, Computation of average rainfall and hydrograph analysis, Intensity duration curve, Rainwater discharges used in collection sewer design.

07 07 722 Industrial Wastewater Treatment

Water and wastewater characteristics, Rates & quality of water supply and wastewater for different industries, Treatment methods.

07 07 723 Surface Water Pollution Control

Pollution, Environment, Pollutants, Air pollution, Water, Land wastewater, Industrial wastes, Irrigation drains, Pesticides, Hyacinth effect in reducing pollutants in water, Transport of wastes in water bodies, Self-purification, Shore pollution, Lakes pollution.

07 07 724 Plumbing

Drinking water, Pipes and sanitary installations water supply to different buildings, Design of interior water systems, Solar heaters, Swimming pools, Interior drainage systems, Design of horizontal sewers.

07 07 725 Solid Wastes Control

Refuse collection and transport from urban and rural areas, Classification of refuse, Refuse analysis, Landfill, Incineration, Composting, Fuel recovery, Air and water pollution consideration.

07 07 726 Economics of Water and Wastewater Projects



Characteristics of (raw water, surface water and ground water, domestic sewage, storm runoff, industrial wastewater), Capital cost of treatment works (civil, mechanical, electrical and control), Maintenance and operation cost benefits from (water, gas, sludge), Recycle water price in the future, Environmental impacts.

07 07 727 Waste Recycle Processes

Origin of wastes, Process industry wastes, Food processing industries, Material industries, Chemical industries, Metals recycling, Waste paper recycling, Paper recovery, Paper recovery from urban waste, Particulate collection.

07 07 728 Hazard Wastes Control

Origin of wastes, Power plants wastes, Fuel processing wastes, Treatment of radioactive wastes, Cost of radioactive waste treatment.

07 07 729 Sanitary Chemistry and Microbiology

Physical, equilibrium and colloid chemistry, Quantitative chemistry, Turbidity, Color, PH, Acidity, Alkalinity, Hardness, Chlorine, Oxygen demand, Bacteria staining, Water as carrier of diseases, Tests of coliform bacteria of importance to sanitary engineers, Algae, Protozoa, Viruses, Problems caused by microorganisms to the environment, Role of microorganisms.

07 07 811 Potable Water Engineering

Introduction of water supply, Fresh water resources and its characteristics, Design period for water supply components, Impurities in water, Inorganic contaminants, Common constituents of natural water, Standards of safe potable water, Sedimentation, Filtration, slow, rapid, direct, and pressure filters, Disinfection, Miscellaneous water treatment techniques, Design of water distribution systems, Storage and pump stations, Water pipes, corrosion and its prevention, Stress in pipes, Valves and appurtenances, Construction and maintenance of distribution systems.

07 07 812 Wastewater Engineering

Sources of wastewater, Fluctuation in wastewater, Combined and separate sewers, Design periods of sewer systems and treatment plants, Storm water flow, Sewer materials, appurtenances, construction, and maintenance, Measurement of flow in sewer lines, Design of sewer systems, Occurrence, effect, and control of the biological transformations in sewers, Collection sumps and pump stations, characteristics of wastewater, Preliminary and Primary treatment, Biological treatment, Sludge treatment and disposal, Advanced wastewater treatment.

07 07 813 Economy of Water and Wastewater Projects



Characteristics of fresh water, costs of water purification plants, Capital cost, Operation and maintenance cost, cost and benefits of pure and safe potable water, Characteristics of wastewater, raw domestic sewage, industrial wastewater, primary treated, secondary treated, and advanced treated, Effect of microbiological and chemical pollution on public health and environment, Effect of hazardous waste on environment, purpose and benefits of advanced wastewater treatment, Cost and benefits of wastewater reuse and industrial wastewater recycle, cost and benefits of complete purification of domestic wastewater, Effect of polluted potable water on public health in developing countries, costs of different processes of wastewater treatment.

07 07 814 Safe Reuse of Water

Characteristics of domestic sewage, industrial wastewater, and irrigation drainage, Effect of primary, secondary, and advanced treatment on wastewater characteristics, Effect of storage on treated water, positive and negative effect of water constituents on soil and plants protection of public health and farm animals, Environmental and social studies, Methods of irrigation, use of sludge as fertilizer, Suitable agricultural crops and products, Benefits of wastewater reuse, Standards used in international organizations for safe treated wastewater reuse.

07 07 815 Environmental Engineering

Natural environmental hazards, Greenhouse effect and ozone depletion, Acid rain, pollution of receiving water, Air pollution, solid wastes management, Hazardous wastes, Environmental impact assessment of engineering projects, Environmental assessment in water quality management planning, Environmental impact assessment of water supply projects, Environmental impact assessment of wastewater projects, Environmental benefits of preventing pollution, Pollution control laws, factors affecting environmental impact assessment, Environmental development, Environmental impact assessment of global projects, case studies.

07 07 816 Sanitary Chemistry

Elements, and compounds, chemical water analysis, Hydrogen ion concentration, Gas solubility, Alkalinity, colloids and coagulation, Organic compounds, Organic matter in wastewater, Laboratory chemical analysis, Jar test, Dissolved oxygen, Chemical oxygen demand, Total organic carbon, carbon absorption.

07 07 817 Sanitary Microbiology

Biological organisms, Ecological approach to the sludge, organisms present in activated sludge and the description of the process, Aquatic food chain, water borne diseases, Indicator organisms for water quality, water as a source of bacterial contamination, Areas where contaminants multiply, Physical and chemical methods of control, Economics of control, Tests for the coliform group, Examination of potable and surface water, BOD of



domestic sewage, BOD of industrial wastewater, Factors affecting growth in biological treatment systems, The enteric viruses in feces, Transmission of viruses in through water, presence of viruses in sewage, Removal of viruses by sewage treatment methods. Primary, secondary and disinfection.

07 07 601 Diploma Project in Sanitary Engineering

Engineering planning, detailed design and drawing project of one of the following subjects: Sewer system, Biological filters, Activated sludge process, Oxidation ditch, Stabilization ponds, Solid waste management, Wastewater reuse.

07 07 701 Master of Engineering Report in Sanitary Engineering

07 07 705 Master of Science Thesis in Sanitary Engineering

07 07 801 Doctor of Philosophy Dissertation in Sanitary Engineering