M.Sc. GRADUATE PROGRAM

Graduate students must take 12 credits from compulsory courses, 12 credits from elective courses, 2 credits as seminar and 6 credits as M.Sc. thesis, overall 32 credits for the fulfillment of M.Sc. degree.

Curriculum for the Degree of Master of Science in Civil Engineering
Major: *Environmental Engineering*

	Course Title	Credit
Semester I		
1610500	Engineering Mathematics	3
1614616	Fundamentals of Advection and Diffusion and Pollution Modeling	3
1614590	Air Pollution & Control Methods	3
1614580	Water Resources Quality Control	3
Semester II		
1614618	Basics of Water and Wastewater Treatment	3
1614624	Basics of Solid Waste Engineering and Management	3
1614622	Advanced Water and Wastewater	3
1614610	Soil Contamination & Remediation	3
Semester III		
9014903	Seminar	2
9010606	M.Sc. Project	6
Semester IV		
9010606	M.Sc. Project (Continue)	0

COURSE DESCRIPTIONS

1610500 Engineering Mathematics
3 Cr.
Review on Basic Mathematics, Ordinary Differential Equations, Special Functions, Calculus of Variations, Vectors and Matrices Algebra, Fourier Analysis, Partial Differential Equations, Complex Analysis.

Instructors: Dr. Mohammad Reza Chamani, Dr. Milad Aminzadeh

1614580 Water Resources Quality Control
3 Cr.
Reaction kinetics, Physical, Chemical, and Biological water quality parameters, Thermodynamics and Chemical Equilibrium, Environmental Microbiology, Water Uses and Water Quality Goals, Objectives and Criteria, Limnology, Stratification, Eutrophication, Principles of Water Quality Modeling and Waste-load Allocation, Transport and Transformation of Chemicals in Water Resources

Instructor: Dr. Masoud Taheriyoun

1614590 Air Pollution and Control Methods
3 Cr.
Introduction & Definitions, Air Pollution Sources, Major Pollutants and Effects , Air Pollution Standards and Air Pollution Index, Particulate Matter, Settling Chambers, Cyclones, Electrostatic Precipitators, Fabric Filters, Wet Scrubbers, Control of Gases, Meteorology, Atmospheric Dispersion Modeling

Instructor: Dr. Hasti Hasheminejad

1614610 Soil Contamination & Remediation
3 Cr.
Contaminant Sources in the Soil, Solute transport in soil, Development and Application of New Remediation Technologies

Instructor: Dr. Milad Aminzadeh

1614616 Fundamentals of Advection and Diffusion and Pollution Modeling
3 Cr.
Modeling Goals and Types and Applications in the Pollution Modeling, Types of Reactors, Modeling Complete Mixed Reactors under Steady and Transient Pollution Loading, Concept of Advection and Diffusion in Mixed Flow Reactors and Analytical Modeling for Steady and Unsteady Condition, Numerical Methods in Pollution Modeling, Uncertainty Analysis of Models and Sensitivity of Models, Advection-Diffusion Modeling in Porous Media, Flow and Pollutant Modeling in Soil using Hydrus
Instructors: Dr. Masoud Taheriyoun, Dr. Milad Aminzadeh

1614618 Basics of Water and Wastewater Treatment
3 Cr.
Water Quality and Standards, Aeration and Air stripping, Mixing, Coagulation and Flocculation, Sedimentation, Floatation, Filtration: Granular Medium Filter, Adsorption: Activated Carbon, Disinfection: Chlorination, Chemical Precipitation: Water Softening, Ion Exchange, Membrane Processes, Chemical Oxidation: Iron and Manganese Removal

Instructor: Dr. Hasti Hasheminejad

1614622 Advanced Water and Wastewater
3 Cr.
Wastewater Quality and Standards, Process Analysis and Design, Physical Unit Operations: Screening, Flow Equalization, Grit Removal, Primary Sedimentation, Fundamentals of Biological Treatment, Activated Sludge Processes, Biological Nitrogen & Phosphorus Removal Processes, Treatment and Disposal of Sludge (Biosolids): Thickening, Stabilization, Digestion, Conditioning, Dewatering

Instructor: Dr. Masoud Taheriyoun

1614624 Basics of Solid Waste Engineering and Management
3 Cr.
Introduction, Solid Waste Generation Rates & Composition, Collection of Municipal Solid Waste, Separation & Treatment Processes, Composting Process, Landfill Disposal, Landfill Gas Generation, Landfill Leachate Generation

Instructors: Dr. Hasti Hasheminejad, Dr. Masoud Taheriyoun