Swarrnim Institute of Technology

M.Tech Environmental Engineering Department

Cross-Cutting Issues

SEMESTER 1					
Sr. No.	**Course Name**	**Human Values**	**professional Ethics**	**Gender Sensitization**	**Environment Sustainability**
1	APPLICATION BASED SYSTEMS FOR TRANSPORT OF WATER & WASTEWATER	Continuity principle, energy principle, momentum principle	Flow measurement and carrying capacity	Water transmission and distribution	Frictional and minor head losses
		Equitable water distribution	Pipe material selection and thickness calculations	Access to safe and reliable water supply	Energy-efficient pump selection
		Need for transport of water and wastewater	Water hammer analysis	Inclusive sanitation	Leak minimization
		Planning of water system	Leak detection in distribution systems	Protection from stormwater impacts	Use of computer software for efficient system design
		Layout of distribution networks	Economics of sewer design	Equitable access in distribution networks	Conveyance of corrosive wastewaters

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		Storage capacity of ESR and underground reservoirs	Sewer inspection and maintenance		Estimation of stormwater runoff
		Design of sanitary sewer	Design of sewer outfalls (mixing conditions)		Rainfall intensity-duration-frequency relationships
		Stormwater drainage necessity	Fair and transparent water and wastewater planning		Rational methods in drainage system design
		Combined and separate drainage systems			
2	ENVIRONMENTAL CHEMISTRY & MICROBIOLOGY	Significance of Environmental Chemistry	Equilibrium Chemistry	Colloidal Chemistry	Units of Measurement
		Stoichiometry	Physical Chemistry	Organic Chemistry	Stoichiometry
		Organic Chemistry	Measurement of Pollution Parameters	Pollution Parameters	Equilibrium Chemistry
		Nuclear Chemistry	Principles of Gravimetric, Volumetric, and Colorimetric Analysis	Impact of Water Quality on Health	Colloidal Chemistry
		Water and Air Quality Analysis	Gas Chromatographic Methods	Turbidity, Colour, and pH Analysis	Nuclear Chemistry

		Biochemical Oxygen Demand	Photoelectric and Polarographic Methods	Alkalinity and Hardness Testing	Wastewater Analysis Methods
		Dissolved Oxygen	Observations, Measurements and Isolation of Microorganism	Scope and Areas of Environmental Microbiology	Testing of Sulphurous Compounds
		Nitrogenous Compounds			Applications in Pollution Monitoring
		Cell and its Structure	Techniques of Staining and Enumeration of Microorganism	Microscopy and Micrometry	Biochemical and Chemical Testing for Environmental Protection
		Introduction to Enzyme and Metabolic Reactions	Spectrophotometry, Flame Photometry	Classification of Microorganisms	Optical Methods (Absorption, Fluorometry)
		Aerobic and Anaerobic Respiration			Applied Microbiology of Soil, Air, Water
					Biological Processes of Wastewater Treatments
					Industrial Microbiology
3	ENVIRONMENTAL IMPACT ASSESSMENT	Public Participation	EIA Notification Provisions	Public Hearing Procedure and Guidelines	Evolution of EIA

		Role of NGO in Public Hearing	Procedure for Environmental Clearance	Social Aspects in Baseline Studies	Concepts, Methodologies, Screening, Scoping, Baseline Studies
		Economic Development and Environmental Degradation	Cost Benefit Analysis	Community Involvement in Project Planning	Mitigation Measures
			Practical Considerations in Impact Assessment		Methods of Impact Analysis (Adhoc, Checklist, Matrix, Network, Index Methods)
					Location of Industries
					Environmental Impacts of Typical Industries and Projects
					Case Studies of Engineering Projects
					Environmental Management Plan
4	WATER & WASTEWATER TECHNOLOGIES	Water Quality Requirements	Wastewater Effluent Standards	Access to Safe Drinking Water	Physical, Chemical, and Biological Water Treatment Processes

		Potable Water Standards	Operational Problems in Filtration	Health Impacts of Water Contamination	Sedimentation, Coagulation and Flocculation
		Biological Parameters of Water	Application of Advanced Treatment Technologies	Community-Based Water Management Participation	Filtration Technologies and Design
		Disinfection and Public Health	Water Supply Scheme Design Considerations		Theory and Methods of Disinfection
					Wastewater Biological Unit Processes
					Ion Exchange and Membrane Processes
					Water Quality Indices
5	RESEARCH SKILLS	Use feedback to improve your work	Understand bias, theoretical position, and evidence produced	Understand inclusive language and representation in writing	Identify key areas in your field with sustainable impact
		Know and follow the process of reviewing and proofreading	Distinguish between your point and the evidence	Promote equal participation in research presentations	Find gaps in knowledge related to sustainability issues

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		Prepare to answer questions with integrity and humility	Identify acceptable levels of error and justify them	Avoid gender bias in critique and literature review	Select research problems addressing environmental concerns
		Acknowledge evidence in written work	Recognize quality and authenticity of sources		Use effective literature search strategies for sustainability-related research
SEMESTER 2					
Sr. No.	Course Name	Human Values	professional Ethics	Gender Sensitization	Environment Sustainability
1	INDUSTRIAL WATER & WASTEWATER TREATMENT	Waste Reduction (Vol. & Strength reduction, Neutralization, Equalization)	Standards for Disposal into Different Sinks	Standards for Disposal, Sludge & Pollution Control	Industrial Water Treatment
		Standards for disposal	Sludge Treatment	CETPs & Joint Treatment	Waste Reduction
		Economic Aspects of Waste Treatment	Economic Aspects (CETPs)		Standards for Disposal
		Pollution Control in Industries	Pollution Control in Industries		Sludge Treatment
					Saline Water Conversion
					Pollution Control in Industries

2	AIR & NOISE POLLUTION CONTROL	Sources, Types, Effects of Air Pollution	Ambient Air Quality & Emission Standards	Effects of Air Pollution	Stack Plume Behavior, Wind Flow, Mixing Height
		Ambient Air Quality & Emission Standards	Dispersion Modeling	Indoor Air & Automobile Pollution	Control Methods (Particulate & Gaseous)
		Noise Pollution	Stack Sampling & Pollution Control	Noise Pollution	Automobile Pollution
		Sampling & Control Methods	Gaseous & Automobile Pollution Control		Noise Pollution
		Gaseous Pollution Control	Noise Pollution		
3	INDUSTRIAL HYGIENE & SAFETY	Historical Aspects, Concept, Scope, Role of IH	Industrial Hygiene vs. Occupational Health	Ergonomics	Role of Environmental Engineer
		Engineering Controls (Hierarchy, PPE, Substitution)	Coordination among Safety Officer, Medical Officer, IH	Occupational Diseases	EHS Program
		Ergonomics	Monitoring Strategies & TLVs	Toxicology	Air Sampling, Ventilation, Emission Controls
		Hazards Identification & Risk Assessment	Control Techniques & PPE Standards	Physical Agents	Toxicology & Hazardous Agents

		Toxicology & Occupational Diseases	Incident Reporting & Investigation	Occupational Health Services	Legislation & Environment Act
		Legislation	Legislation on Safety & Health		
4	SOLID & HAZARDOUS WASTE MANAGEMENT	Sources & Classification, Need for Waste Management	Indian Waste Management Legislation (MSW, BMW, E-waste, etc.)	Handling & Segregation at Source	Sources & Classification of Waste
		Roles of Stakeholders	Hazardous Waste Transport & Labelling	Biomedical Waste	Waste Characterization & Reduction
		Waste Disposal & Rehabilitation	Biomedical Waste Treatment	E-waste & Informal Sector	Waste Processing & Thermal Conversion
		Standards for Hazardous Waste Generators	Financing Waste Management	Economic Aspects of Waste Management	Landfill Design, Leachate & Gas Management
		Extended Producer Responsibility	EPR & Waste Exchange		E-waste, Plastics, Fly Ash, Nuclear Waste
5	CLIMATE CHANGE	Science of Climate Change & Global Warming	Climate Modeling	Climate Impacts	Greenhouse Gases & Climate Modeling
		Greenhouse Gases & Carbon Emissions	Kyoto Protocol, CDM, Emission Trading	Adaptation Strategies	Impacts on Forests, Water, Energy, Agriculture

		Impacts & Adaptation	Environmental Economics	Health Impacts of Climate Change	Renewable Energy & Mitigation
		Climate Mitigation Technologies & Green Buildings	Mitigation Policies	Policy & Participation	Environmental Economics
		Climate Policy Frameworks	Vulnerability & Adaptation		
SEMESTER 3					
Sr. No.	Course Name	Human Values	professional Ethics	Gender Sensitization	Environment Sustainability
1	AIR POLLUTION CONTROL EQUIPMENT	Role of NGOs	Design and operation of control equipment with accuracy and accountability	Health implications of air pollution with respect to vulnerable groups	Control of particulate matter and gaseous pollutants
		Awareness of health impacts of particulate matter	Justification of collection efficiencies and performance claims	Equitable access to clean air technologies and public participation	Gravity settling chambers, cyclone separators, and electrostatic precipitators
		Importance of air quality for community well-being	Responsible use of hazardous control technologies	Gender-sensitive planning in pollution control projects	Scrubbers, filters, adsorption and condensation systems

					Mist elimination and regenerative systems for energy conservation
					Design of air pollution control equipment
SEMESTER 4					
Sr. No.	Course Name	Human Values	professional Ethics	Gender Sensitization	Environment Sustainability
1	ENVIRONMENTAL LEGISLATIONS & MANAGEMENT	Environmental Legislation & Enforcement	Environmental Protection Acts	Pollution Effects & Legislation	Air, Water & Land Pollution Acts
		Functions of Pollution Control Boards	Enforcement Challenges	Energy-Efficient Buildings	Environmental Monitoring & Audit
		Constitutional Provisions & Duties	Environmental Audit (ISO 14000)	Environmental Governance	ISO 14000 & EMS
		Energy-Efficient Buildings	CDM & Carbon Trading	CDM & Community Projects	Energy Conservation in Buildings
		CDM & Sustainability	Penal Code & Legal Provisions		CDM & UNFCCC Mechanisms