Course Specifications

General Information

Course name	Wastewater Treatment
Course number	GEOL4343
Faculty	
Department	
Course type	Major Needs
Course level	4
Credit hours (theoretical)	2
Credit hours (practical)	1
Course Prerequisites	

Course Objectives

1 - The objectives of a wastewater treatment course are designed to provide students with a comprehensive understanding of the principles, processes, and technologies involved in the treatment of wastewater. The specific objectives: 1. Introduction to Wastewater Treatment: Introduce students to the importance of wastewater treatment in protecting public health and the environment. Familiarize them with the sources and characteristics of wastewater, as well as the regulatory framework governing wastewater treatment. 2. Wastewater Quality and Characterization: Explain the physical, chemical, and biological parameters used to characterize wastewater. Teach students how to conduct wastewater sampling, analysis, and interpretation of results. Emphasize the importance of wastewater characterization for designing appropriate treatment processes. 3. Fundamentals of Biological Treatment: Provide an understanding of the principles and processes involved in biological wastewater treatment. Cover topics such as microbial growth kinetics, activated sludge process, aerobic and anaerobic digestion, and nitrification and denitrification. Discuss the factors influencing biological treatment efficiency and stability.

2 - 1. Introduction to Wastewater Treatment • Importance of wastewater treatment • Sources and characteristics of wastewater • Regulatory framework for wastewater treatment 2. Wastewater Quality and Characterization • Parameters used to characterize wastewater (physical, chemical, biological) • Sampling and analysis techniques for wastewater • Interpretation of wastewater quality data 3. Preliminary Treatment • Screening and grit removal • Flow measurement and equalization • Primary sedimentation 4. Biological Treatment • Fundamentals of microbiology and microbial growth kinetics • Activated sludge process • Trickling filters and rotating biological contactors • Anaerobic digestion 5. Physical and Chemical Unit Processes • Coagulation and flocculation • Sedimentation • Filtration (gravity, rapid sand, multimedia) • Disinfection (chlorination, ultraviolet radiation) 6. Advanced Treatment Processes • Membrane filtration (microfiltration, ultrafiltration, nanofiltration, reverse osmosis) • Adsorption and ion exchange • Advanced oxidation processes (ozonation, UV/H2O2) • Nutrient removal (phosphorus and nitrogen)

3 - PowerPoint lectures and videos,