

**THE HONG KONG UNIVERSITY OF SCIENCE AND
TECHNOLOGY**

Department of Civil & Environmental Engineering

Course	:	CIVL 4460 Process Design of Environmental Engineering Facilities (Fall 2024-25)	
Units	:	[3-0-3:3]	
Instructors	:	Prof. CHEN Guanghao Email: ceghchen@ust.hk Dr. DENG Yangfan (Co-instructor) Email: yfdeng@ust.hk	
Teaching Assistants	:	LIU Yuewei	Email: yliukl@connect.ust.hk
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Lectures	:	MoWe 10:30AM - 11:50AM	G002, CYT Bldg
Tutorial	:	Mo 01:30PM - 02:20PM	Rm 5506, Lift 25-26

(*Note: Tutorial will be announced in due course.)

***** Course Description *****

Chemical, physical, and biological processes are normally employed to clean up water and wastewater. This course emphasizes the practical design of various elements of water and wastewater treatment systems, including aeration, coagulation and flocculation, sedimentation, filtration, screening, pumping, disinfection, and sludge treatment. Students will have an opportunity to learn about the theory behind different environmental facilities and how water and wastewater treatment plants are designed.

***** Course Outline *****

1. Overview of Water & Wastewater Engineering

- Introduction of water treatment
- Introduction of wastewater treatment

2. System Considerations

- Determination of design flow and constituent loading
- Material balance

3. Physical and Chemical Treatment

- Bar screening & Grit chamber
- Coagulation & Flocculation
- Sedimentation & Flotation
- Filtration
- Membrane separation
- Disinfection

4. Biological Wastewater Treatment

- Organic matter removal
- Biological nitrogen removal
- Biological phosphorus removal
- Biological biofilm

5. Organic Waste Treatment (Bioenergy)

- Thickening/Dewatering/Drying (Pre-treatment)
- Anaerobic digestion
- Biomass to biofuels and biochar
- Biomass to heat and power

6. Other topics on emerging environmental technologies (Optional)

*** *Required Texts and Materials* ***

- MWH's Water Treatment: Principles and Design. *John Crittenden et al., John Wiley & Sons.*
- Wastewater Engineering, Treatment, Disposal, and Reuse. *George Tchobanoglous et al., Inc. Metcalf & Eddy.*
- Biological Wastewater Treatment: Principles, Modelling, and Design. *G.H.Chen et al., IWA Publishing.*
- Bioenergy: Principles and Applications. *Yebo Li & Samir Khanal, John Wiley & Sons.*

*** *Mark Allocation* ***

- One literature review project 40% of the final mark
- Attendance/In-class Exercise 20% of the final mark
- Final Design Project 40% of the final mark