



**UNIVERSITI TEKNOLOGI MARA**

**CMT565: WATER AND WASTEWATER TECHNOLOGY**

<b>Course Name (English)</b>	WATER AND WASTEWATER TECHNOLOGY <b>APPROVED</b>
<b>Course Code</b>	CMT565
<b>MQF Credit</b>	4
<b>Course Description</b>	The course deals with the characterization of water and wastewater; sampling and preservation; measurement of water flowrate; physical, chemical and biological methods of treatment of water and wastewater; treatment of boiler feed water and cooling tower water as well as environmental impact assessment. The students will have hand-on experiences in the laboratory and acquire further information through field visit or class assignment.
<b>Transferable Skills</b>	Knowledge in performing water and wastewater quality testing
<b>Teaching Methodologies</b>	Lectures, Lab Work, Field Trip
<b>CLO</b>	<p>CLO1 Discuss the concept of water and waste water quality</p> <p>CLO2 Describe various treatment technologies for water and wastewater</p> <p>CLO3 Categorize the application and problems associated with water and waste water in industries</p> <p>CLO4 Perform water and waste water quality tests on industrial effluents and surface waters, and report experimental findings</p>
<b>Pre-Requisite Courses</b>	No course recommendations
<b>Topics</b>	
<b>1. Characterization of Water and Wastewater</b>	
1.1) Physical parameters 1.2) Chemical parameters.	
<b>2. Characterization of Water and Wastewater</b>	
2.1) Biological parameters 2.2) Water quality index	
<b>3. Sampling and Preservation</b>	
3.1) Types of sample. 3.2) Storage and labeling of samples.	
<b>4. Measurement of flowrate</b>	
4.1) Weir. 4.2) Parshall flume.	
<b>5. Water treatment</b>	
5.1) Introduction to water treatment 5.2) Aeration 5.3) Coagulation and flocculation. 5.4) Filtration	
<b>6. Water treatment</b>	
6.1) Water Hardness 6.2) Disinfection	
<b>7. Basic biochemistry and microbiology</b>	
7.1) Metabolic processes 7.2) Microorganisms in water role in the natural environment. 7.3) Classification of bacteria	

<p><b>8. Municipal wastewater treatment</b>  8.1) Introduction to municipal wastewater treatment.  8.2) Primary treatment</p>
<p><b>9. Municipal wastewater treatment</b>  9.1) Secondary treatment  9.2) Tertiary treatment</p>
<p><b>10. Industrial wastewater treatment</b>  10.1) Suspended and attached growth systems of microorganisms.  10.2) Reaction kinetics for the growth of microorganisms and food utilization.  10.3) General description of the process of an activated sludge</p>
<p><b>11. Industrial wastewater treatment</b>  11.1) Application of reaction kinetic in activated sludge.  11.2) Configurations of activated sludge process  11.3) The operational problems of activated sludge process</p>
<p><b>12. Industrial wastewater treatment</b>  12.1) Oxidation pond  12.2) Sequencing batch reactor  12.3) Attached growth systems  12.4) Wetland treatment system</p>
<p><b>13. Industrial wastewater treatment</b>  13.1) Nutrient removal: Oxidation ditch  13.2) Anaerobic digestion</p>
<p><b>14. Boiler and cooling tower feed water</b>  14.1) Issues in boiler operation.  14.2) Issues in cooling tower operation.  14.3) Treatment of the feedwater</p>

<b>Assessment Breakdown</b>	<b>%</b>
Continuous Assessment	60.00%
Final Assessment	40.00%

<b>Details of Continuous Assessment</b>	<b>Assessment Type</b>	<b>Assessment Description</b>	<b>% of Total Mark</b>	<b>CLO</b>
	Group Project	n/a	10%	CLO3
	Lab Exercise	n/a	30%	CLO4
	Writing Test	n/a	20%	CLO2

<b>Reading List</b>	This Course does not have any book resources
<b>Article/Paper List</b>	This Course does not have any article/paper resources
<b>Other References</b>	This Course does not have any other resources