

1.	Name of Course	Water Supply Engineering				
2.	Course Code	JGTE3253				
	JGTE = the first alphabet identify the faculty within which the subject is offered., JGTE = the remaining three alphabet identify the course that offers the subject, 3253 = the first digit identify level of study; in this case undergraduate level, 3253 = the second and third digits identify subject identity and 3253 = the fourth digit identify credit value or credit hours					
3.	Name(s) of academic staff	To be Assigned				
4.	Rationale for the inclusion of the course/module in the programme	Knowledge of water engineering is essential for civil engineering students as good water quality supply for domestic and industries are basic needs.				
5.	Semester and Year offered	2/3				
6.	Total Student Learning Time (SLT)	Face to Face				Total Guided and Independent Learning
	L = Lecture T = Tutorial P = Practical S =Studio Works O = Others	L	T	P/S	O	Independent Study(IS)=56 Total =126
		42	14	14	-	
7.	Credit Value	3.0				
	Lecture (3 hours per week x 14 weeks) Tutorial (1hour per week x 14 weeks) Practical (2 hours fortnightly for 7 weeks)					
8.	Prerequisite (if any)	Engineering hydrology (JEHY3243)				
9.	Course Objectives: 1.To introduce the students to the basic water supply engineering involving the source, quality, treatment and distribution of water. Course Learning Outcomes (CLO) At the end of the semester students should be able to: CLO1: Understanding the source of water and water demand. CLO2: Understanding the purification of water supply. CLO3: Understand water treatment concept and methods. CLO4: Understanding water distribution processes.					
10.	Transferable Skills: This course is expected the development of the following transferable skills: a) Self-management – an ability to manage time and task b) Learning skills - An ability to learn both independently and co—operatively; - An ability to use library skills, to find and organize information ; - An ability to use a wide range of academic skills (research, analysis, synthesis etc.); - An ability to identify and evaluate personal learning strategies. c) Teamwork - An ability to take responsibility and carry out agreed task; - An ability to take initiative and lead other; - An ability to identify and evaluate personal learning strategy. d) Problem solving - An ability to analyse; - An ability to think laterally about a problem;					

	▪ An ability to identify strategy options; ▪ An ability to solve the problems e) Information technologies ▪ An ability to use specialist software where relevant to the discipline.														
11.	Teaching-learning and assessment strategy A variety of leaching strategies are used throughout the course, including the following: • Classroom Lessons; Lecturer and power point presentations • Tutorial Session; • Student-Lecturer Discussion • Collaborative and Co-operative learn; • Independent study. Assessment: <table> <tr> <td>Coursework</td><td>40%</td></tr> <tr> <td>Assignment</td><td>5%</td></tr> <tr> <td>Tutorial/Quizzes</td><td>5%</td></tr> <tr> <td>Laboratory work</td><td>10%</td></tr> <tr> <td>Test</td><td>20%</td></tr> <tr> <td>Examination</td><td>60%</td></tr> <tr> <td><u>Total</u></td><td><u>100%</u></td></tr> </table>	Coursework	40%	Assignment	5%	Tutorial/Quizzes	5%	Laboratory work	10%	Test	20%	Examination	60%	<u>Total</u>	<u>100%</u>
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12.	Synopsis: This course covers the topics on source of water, quality of water, water treatment methods and distribution of water.														
13.	Mode of Delivery: Lectures Tutorials.														

14.	Performance Criteria :						
	CLO-PLO	Assessment Tool	1	2	3	4	5
	Marks		0-39	40-49	50-59	60-74	75-100
	Grade		(F)	(D,D+)	(C-,C,C+)	(B-,B,B+)	(A-,A,A+)
	CLO1: Understanding the source of water and water demand.	Assignment Tutorials Quizzes Laboratory work Test Examination	Fail to: - Learn both independent and cooperatively - Use library skills, to find and organize information - Take responsibility and carry out laboratory test - Manage time and task	Poor to: - Learn both independent and cooperatively - Use library skills, to find and organize information - Take responsibility and carry out laboratory test - Manage time and task	Satisfactory to: - Learn both independent and cooperatively - Use library skills, to find and organize information - Take responsibility and carry out laboratory test - Manage time and task	Good to: - Learn both independent and cooperatively - Use library skills, to find and organize information - Take responsibility and carry out laboratory test - Manage time and task	Excellent to: - To: Learn both independent and cooperatively - Use library skills, to find and organize information - Take responsibility and carry out laboratory test - Manage time and task
	CLO2: Understand the purification of water supply.	Assignment Tutorials Quizzes Laboratory work Test Examination	Fail to: - Learn both independent and cooperatively - Use library skills, to find and organize information - Take responsibility and carry out laboratory test - Manage time and task	Poor to: - Learn both independent and cooperatively - Use library skills, to find and organize information - Take responsibility and carry out laboratory test - Manage time and task	Satisfactory to: - Learn both independent and cooperatively - Use library skills, to find and organize information - Take responsibility and carry out laboratory test - Manage time and task	Good to: - Learn both independent and cooperatively - Use library skills, to find and organize information - Take responsibility and carry out laboratory test - Manage time and task	Excellent to: - To: Learn both independent and cooperatively - Use library skills, to find and organize information - Take responsibility and carry out laboratory test - Manage time and task

	CLO3: Understanding water treatment concept and methods.	Assignment Tutorials Quizzes Laboratory work Test Examination	Fail to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Poor to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Satisfactory to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Good to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Excellent to: • To: Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task
	CLO4: Understanding water distribution processes.	Assignment Tutorials Quizzes Laboratory work Test Examination	Fail to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Poor to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Satisfactory to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Good to: • Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task	Excellent to: • To: Learn both independent and cooperatively • Use library skills, to find and organize information • Take responsibility and carry out laboratory test • Manage time and task

15.	Mapping of the Programme Objectives to the Programme Learning Outcomes											
Programme Learning Outcomes (PLO) Programme Objectives (PO)		PLO1: Ability to acquire and apply knowledge of science and engineering fundamentals;	PLO2: Acquired in-depth technical competence in civil engineering discipline;	PLO3: Ability to undertake problem identification, formulation and solution;	PLO4: Ability to utilize systems approach to design and evaluate operational performance;	PLO5: Understanding of the principles of design for sustainable development;	PLO6: Understanding of professional ethics, Islamic values, social, cultural, global and environmental responsibilities of a professional engineer and commitment to them;	PLO7: Ability to communicate effectively, not only with engineers but also with the community at large;	PLO8: ability to function effectively as an individual;	PLO9: Ability to function effectively in group with the capacity to be a leader or manager;	PLO10: Recognizing the need to undertake lifelong learning, and possessing /acquiring the capacity to do so;	PLO11: ability to become Entrepreneur;
PEO1: To produce graduates with proficient knowledge and competency in various areas in Civil/ Electrical/ Mechanical Engineering		✓	✓	✓								
PEO2: To produce graduates with professional, generic attributes to meet the present and future global demands.					✓	✓	✓			✓	✓	
PEO3: To produce graduates with Islamic humanistic values and reinvention skills to meet the requirement of a dynamic environment. These skills include Civil Intelligence, Moral Intelligence, Self-Reliance and Communication Skills								✓	✓	✓		✓

16.	Mapping of the course Learning Outcome to the Programme Outcome										
Programme Learning Outcomes (PLO) Course Learning Outcome (CLO)	PLO1: Ability to acquire and apply knowledge of science and engineering fundamentals;	PLO2: Acquired in-depth technical competence in civil engineering discipline;	PLO3: Ability to undertake problem identification, formulation and solution;	PLO4: Ability to utilise systems approach to design and evaluate operational performance;	PLO5: Understanding of the principles of design for sustainable development;	PLO6: Understanding of professional ethics, Islamic values, social, cultural, global and environmental responsibilities of a professional engineer and commitment to them;	PLO7: Ability to communicate effectively, not only with engineers but also with the community at large;	PLO8: ability to function effectively as an individual;	PLO9: Ability to function effectively in group with the capacity to be a leader or manager;	PLO10: Recognising the need to undertake lifelong learning, and possessing /acquiring the capacity to do so;	PLO11: ability to become Entrepreneur;
	CLO1: Understanding the source of water and water demand.	✓									
	CLO2: Understand the purification of water supply.	✓									
	CLO3 Understand water treatment concept and methods. Understanding water distribution processes.	✓	✓	✓							
	CLO4: Understanding water distribution processes.	✓	✓	✓							

17.	Content outline of the course/module and the SLT per topic						
		Details	SLT (Hour)				
			L	T	P	IS	Total
	Topic 1	The importance and requirement of water for public and industrial use. Different purpose of water usage. Present and future water availability and demand.	3	1	-	4	8
Topic 2	Water and Water Demand • Source of water supply – surface and ground water sources • Water quacity obtained from different sources, protection and cleanliness for wells. • Quantity of water required - methods of population estimation • Changes in rate of water consumption • Design period - meaning and importance. Methods of forecasting and population increase. Factors affecting consumption. Fire demand. Fluctuations in demand.	9	3	-	12	24	
Topic 3	Purification of Water • Sedimentation Theory of sedimentation. Stoke's Law. Sedimentation in an ideal tank. Surface flow rates. Batch settlement analysis. Settlement efficiency. • Coagulation Mechanism of coagulation. Coagulants and their actions. (Alum, ferrous and ferric compounds, polyelectrolytes), Jar test. • Flocculates Relationship between power input and velocity gradient. Hydraulic and Mechanical flocculators. • Infiltration Interception storage, storage drop for infiltration capacity, infiltration rate, infiltration coefficient, indexsHarton, Philip and Green Ampt equations. • Filtration Hydraulics of filtration. Rose and Carmen Kozeny equations. Filter back washing. • Disinfection Factors affecting disinfection. Chick’s and Watson's Law Chlorination, Chlorine residual curve. Distribution of hypochlorite in water at different pH values. Ozonation. Comparison between chlorination and ozonation.	12	4	-	16	32	

