Course Name (English)	WATER RESOURCE TECHNOLOGY APPROVED
Course Code	EVT525

MQF Credit	4

Course Description	This course will interactively engage students cognitively and scientifically in areas of water resource technology. Students will state, write, and explain the fundamental principles behind the various steps in water quality monitoring, treatment processes, pollution of water resources and its protection. Students will also be introduced to sampling and data analysis procedures, quality control and quality assurance besides the calculation of the water quality index and its interpretation. The designated lecture session is used to discuss various water resource technologies and practices. Lecture sessions employ a mixture of lectures and active learning (self and peer discussions). Students will perform evaluation of surface water, via standard sampling and preservation procedures, as well as standard analytical techniques and wet chemistry during the practical sessions and will verbally and in writing discuss the results and relationships with peers and facilitator. The outcomes shall be assessed through a variety of tools which include the traditional paper examination, tests, written assignment and oral presentation, laboratory reports and classroom engagement.

Transferable Skills	student will able to conduct by themselves with the WQI system, they will learn the process of water treatment plant and also regarding the water quality procedures

Teaching Methodologies	Lectures, Blended Learning, Lab Work, Field Trip, Case Study, Discussion

CLO	CLO1 Explain the knowledge and principle concepts of water resource technology
	CLO2 Describe the process of water treatment and water quality monitoring system in order to solve water pollution problems.
	CLO3 Perform practical skills in investigation of water treatment and anlysis.
	CLO4 Demonstrate information management skill in producing scientific laboratory

Pre-Requisite Courses	No course recommendations

Topics
1. Source of water supply 1.1) 1.1 Sources of water supply 1.2) 1.2 Identification of water resources 1.3) 1.3 Natural and processed freshwater 1.4) 1.4 Major water compartments – groundwater and surface water 1.5) 1.5 Estimation of water demand for water supply
2. Hydrology of Water 2.1) 2.1 Hydrologic cycle and water budget 2.2) 2.2 Precipitation, runoff, water storage and evaporation 2.3) 2.3 Hydrologic equation and water balance in nature 2.4) 2.4 Estimation of runoffs, storage and evapo-transpiration
3. Water Quality Characteristics 3.1) 3.1 Chemical characteristics: pH, alkalinity, conductivity, BOD, COD, TOC 3.2) 3.2 Physical characteristics: SS, Turbidity, colour and temperature 3.3) 3.3 Biological characteristics: Bacteria, fungi, viruses and multicellular organisms 3.4) 3.4 Environmental significance of water quality parameters 3.5) 3.5 Water borne diseases : coliform indicator organisms and biological treatments 3.6) 3.6 Calculation of Water Quality Index (DOE-WQI)

4. Pollution and Source Protection
4.1) 4.1 Quality of surface and groundwater
4.2) 4.2 Category of water pollutants: point and non point source
4.3) 4.3 Impact of water pollutants on water resources
4.4) 4.4 Pollution of surface water: Eutrophication
4.5) 4.5 Case study

5. Water Processing
5.1) 5.1 Coagulation and flocculation, filtration chemical feeders and turbidity removal
5.2) 5.2 Taste and odour control
5.3) 5.3 Synthetic, organic and chemical removal
5.4) 5.4 Precipitation, softening, stabilization and disinfections
5.5) 5.5 Water treatment plants: management waste from treatment
5.6) 5.6 New technologies in water treatment

6. Water Quality Monitoring in Distribution System
6.1) 6.1 Purpose of water quality monitoring
6.2) 6.2 Design of a monitoring programme and network
6.3) 6.3 Sample collection: grab, composite and integrated samples, preservation procedures and analysis of raw surface water, frequency and identification of location
6.4) 6.4 Lab procedures and quality control
6.5) 6.5 Data manipulation and reporting
6.6) 6.6 Assessment and recommendation

7. Surface and Groundwater Monitoring System
7.1) 7.1 Design and operation network
7.2) 7.2 Procedure and sampling equipment
7.3) 7.3 Issues related to sampling procedures
7.4) 7.4 Factors affecting the monitoring system

8. Quality Assurance and Quality Control
8.1) 8.1 Project organization and responsibility
8.2) 8.2 Objectives of quality assurance
8.3) 8.3 Quality control check: precision, accuracy and comparability
8.4) 8.4 Performance and system audits
8.5) 8.5 Correction procedures

9. Presentation
9.1) Field Work Site Visit

Assessment Breakdown	%
Continuous Assessment	70.00%
Final Assessment	30.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	assignment	30%	CLO4
	Presentation	presentation	20%	CLO2
	Written Report	Lab report & Lab skill	20%	CLO3

Reading List	Recommended Text	Larry W. Mays 2012, *Ground and Surface Water Hydrology*, John Wiley & Sons, Inc. United State America [ISBN: 978-0-470-169]
	Reference Book Resources	Gary NF 2005, *Water Technology: An Introduction for Environ*, 2 Ed., , John Wiley Publishers, London [ISBN:]
		Cech T.V 2003, *Principles of Water Resources: Development, M*, Ed., , Wiley Publishers, London. [ISBN:]
		Viessman W. and Hammer MJ 2005, *Water Supply and Pollution Control*, 7 Ed., , Pearson Prentice Hall, New Jersey [ISBN:]
		Mayer, R.J. 2001, *Water and Air: Fundamental Resources*, Ed., , McGraw-Hill companies, New York. America. [ISBN:]
		Peirce J.J., Weiner, R.F., and Vesilind, P.A. 1998, *Measurement of Water Quality*, 4 Ed., , Butterworth-Heinemann, Woburn. America [ISBN:]
		Cunningham, W.P., Cunningham, M.A. 2004, *Principle of Environmental Science: Water Res*, McGraw-Hill companies, New York. America
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	