Level 4 Water

Unit Title	Understanding the chemical and biological characteristics of water and wastewater (J/503/1463)
Level	3
Credit Value	6

Learning Outcomes – *the learner will be able to:*	**Assessment Criteria** – *the learner c an:*
1. Understand the System International (SI) unit of measurement used in water and wastewater	1.1 identify System International (SI) units of measurement used in water and wastewater, in terms of: (a) volume (b) mass.
2. Know and understand the chemical characteristics of water and wastewater	2.1 describe the chemical nature of common substances (gas, liquid, solid), in terms of: (a) element (b) atom (c) molecule (d) ion. 2.2 explain the differences between chemical compounds, mixtures, solutions, suspensions and colloids. 2.3 describe types of chemical bonds, including: (a) ionic (b) covalent (c) hydrogen bonding. 2.4 describe basic chemical characteristics in relation to the study of water and wastewater, including: (a) water (b) salts (c) acids (d) bases (e) solubility (f) oxidation & reduction (g) other common components or contaminants.. 2.5 describe the physical properties of uncontaminated water in terms of: (a) boiling point (b) freezing point (c) effect of temperature on mass (d) density (e) surface tension (f) solvent properties (g) viscosity (h) temperature and dissolved oxygen concentration. 2.6 identify common causes of contamination, including: (a) accidental spillage (b) trade effluents (c) nutrient enrichment (d) run off (e) intensive animal farming run off.
3. Understand the biological and microbiological characteristics of water	3.1 describe the types of **micro-organisms** found in the water and wastewater environment.

and wastewater	3.2 describe the types of **macro-organisms** found in the water and wastewater environment 3.3 explain the importance of monitoring chemical and biochemical oxygen demand in wastewater. 3.4 explain the importance of monitoring turbidity and chlorine demand in water 3.5 describe common **pathogens** and diseases found in water. 3.6 list common methods of disinfection of contaminated water, including: (a) filtration (b) chlorination (c) ultra-violet (d) ozone 3.7 explain the implications of contamination for water companies. 3.8 explain why the propagation of desired organisms and the control of undesirable organisms in water and wastewater is important. 3.9 identify a selection of macro (invertebrates) and micro organisms in water and wastewater. 3.10 name some of the common waterborne pathogens and the disease they cause.
4. Understand parameters used to measure quality of water, wastewater and trade effluent.	4.1 outline the chemical, biological and physical parameters used to measure the quality of water and wastewater, including: (a) raw water (b) drinking water (c) sewage (d) trade effluent (e) treated wastewater effluent (f) river water.
Additional information about the unit	
Unit purpose and aims	This unit is designed to allow the learner to develop an understanding of chemical and biological characteristics of water and wastewater. Learners will gain an understanding of how these characteristics affect treatment processes and will be able to evaluate the parameters required to measure the quality of water and wastewater.
Unit expiry date	31/03/2016
Details of the relationship between the unit and relevant national occupational standards or other professional standards or curricula (if appropriate)	-
Terms and definitions applicable to the assessment criteria (agreed with the sector body) *(Please note: This section is not replicated on the Regulatory IT System but is required when assessing the unit.)*	Some items, listed in the assessment criteria, cover a variety of situations, as follows: 1. **Polar and non-polar (solubility) molecules** include: (a) hydrophobic (b) hydrophilic (c) detergents (grease oil fat) . 2. **Types of microorganisms** include:

	(a) viruses, bacteria (b) protozoa (c) fungi (d) algae (e) microbial growth (f) pathogens. 3. **Types of macro organisms (invertebrates)** include: (a) zebra mussels (b) chironomids (c) fly larvae (d) acellus (e) other common organisms. 4. **Common pathogens and diseases** include: (a) E. coli (b) Cryptosporidium (c) Leptospirosis (d) Cholera (e) typhoid.
Assessment requirements or guidance specified by a sector or regulatory body (if appropriate)	Some terms in the assessment criteria cover a range of situations. Refer to the full assessment requirements and guidance for a detailed list of terms and definitions, agreed with Energy & Utility Skills. This unit must be assessed in line with the Energy & Utility Skills assessment strategy for water knowledge qualifications. The unit must be assessed using a knowledge assessment.
Location of the unit within the subject/sector classification system	4.1 Engineering
Name of the organisation submitting the unit	CABWI Awarding Body
Availability for use	Restricted to CABWI Awarding Body
Unit guided learning hours	60