ZBRE C2101: Mechanical and Electrical Technology in Brewing and Distilling

Module Title:	Mechanical and Electrical Technology in Brewing and Distilling
Language of Instruction:	English

Credits:	10

NFQ Level:	6

Module Delivered In	1 programme(s)

Teaching & Learning Strategies:	This module will be delivered through lectures and practical sessions. A variety of active learning strategies will be employed to ensure that the learning objectives are met. The practical component will support the theoretical aspects of the module and promote deep learning via, the formulation of simple hypotheses, structured investigation of simple problems and application of prior knowledge

Module Aim:	The aim of this module is to provide the student with an introduction to the principles of physics for brewing and distilling and to develop practical laboratory skills in physics for brewing and distilling.

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	Explain the fundamental principles of heat transfer and fluid flow.
LO2	Describe compressed air and steam generation and distribution systems.
LO3	Recognise the relevance of materials of construction in the context of brewing and distilling requirements
LO4	Identify types of control systems used in brewing and distilling manufacturing process
LO5	Explain the operation of a PLC, how inputs and outputs are connected to it, how a program is executed inside it and how information can be taken from it.

Pre-requisite learning
Module Recommendations *This is prior learning (or a practical skill) that is recommended before enrolment in this module.*
No recommendations listed
Incompatible Modules *These are modules which have learning outcomes that are too similar to the learning outcomes of this module.*
No incompatible modules listed
Co-requisite Modules
No Co-requisite modules listed
Requirements *This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.*
No requirements listed

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Module Content & Assessment

Indicative Content
Process Instrumentation 1 Principle of operation and use of process instrumentation including the 4-20mA analogue output. • - Pressure switches - Pressure transmitters, single and differential. • Temperature - Principles and construction of RTD,s - Measurement systems for RTD,s - - • Level - Mechanical (float based) level systems - Capacitance type level systems - Ultrasonic type level systems - - Load cell type level systems • Flow - Differential type flow meters - Volumetric flow meters - Mass Flow meters
Electrical Systems Lock Out-Tag Out, Safety systems, RCDs, MCBs, Earthing & Bonding, Single & three phase theory, Electricity in the workplace.
Control Systems 1 Definition, description and aims of sequential control including sensors, controllers and actuators • Pneumatic control - Cascade control - Electro/Pneumatic control - Electro-pneumatic symbols used in pneumatic circuit design - Pneumatic Valves - Solenoids - Actuators - Circuit design - Grouping relays - Safety precautions • Electronic Control - Variable Speed Drives, • PLC's - Range of PLC's and their applications - Programming methods
Fluid Mechanics • Properties of fluids and fluid flow • Newtonian and non-Newtonian fluids (with brewery examples) • Pipe networks and fluid friction • Pumps and pumping equipment
Steam Generation and Steam systems • Properties of steam • Steam boilers and operation • Steam distribution and condensate recovery
Principles of Heat Transfer & Heat Exchangers • Newton's law of cooling • Fourier's law of conduction • Conductance of solid layers • Conductance of boundary layers • Heat losses & gains from surfaces, • Log Mean Temperature Difference • Heat exchangers
Refrigeration & Cooling • Introduction to refrigeration cycles & evaporative cooling • Cooling towers

Assessment Breakdown	%
Continuous Assessment	30.00%
Practical	40.00%
End of Module Formal Examination	30.00%

Special Regulation
Students must achieve a minimum grade (35%) in the CA/Practical and Final Examination

Continuous Assessment

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Multiple Choice Questions	Written class tests and or online assessment may be employed to encourage individual learning.	1,2,3,5	30.00	Ongoing

No Project

Practical

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Practical/Skills Evaluation	Practical laboratory exercises include; • Hardwiring electropneumatic circuits, direct and indirect wiring of contactors, timer blocks. • Basic programming of VSD • Basic programming of PLC's using simulation software. • Verification of various instruments accuracy and repeatability.	4,5	40.00	Every Second Week

End of Module Formal Examination

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Formal Exam	A final written examination will assess the extent to which the student has achieved the module learning outcomes.	1,2,3,4	30.00	End-of-Semester

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

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Module Workload

Workload: Full Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
Lecture	12 Weeks per Stage	6.00
Laboratory	12 Weeks per Stage	2.00
Independent Learning	15 Weeks per Stage	10.27
	Total Hours	250.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_SABRE_B	Bachelor of Science (Honours) in Brewing and Distilling	3	Mandatory