Republic of Rwanda
Ministry of Education

RTB | RWANDA TVET BOARD

CURRICULUM STRUCTURE

RQF LEVEL 3

TVET CERTIFICATE III
in
Electrical Technology

ENGELT3001

Kigali, May 2022

RTB | RWANDA TVET BOARD

ENGELET3001-TVET CERTIFICATE III

Electrical Technology

RQF Level 3 CURRICULUM

Supported by

Handwerkskammer Koblenz

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Rwanda TVET Board (RTB)

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P.O. Box: 4940 Kigali, Rwanda

Original published version updated:

May 2022

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P.O. Box: 4940 Kigali, Rwanda

List of Abbreviations

4IR	Fourth Industrial Revolutions
AI	Artificial Intelligence
BPO	Business Process Outsourcing
CAD	Computer Aided Design
CDU	Curriculum Development Unit
CM	Complementary Modules
CV	Curriculum Vitae
DACUM	Developing a Curriculum
HR	Human Resources
IAP	Industrial Attachment Program
IOT	The Internet of Things
MINEDUC	Ministry of Education
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment
REQF	Rwandan Education Qualification Framework
RP	Rwanda polytechnic
SWOT	Strength Weakness Opportunities and Treats
TSS	Technical Secondary School
TVET	Technical and Vocational Education and Training
WDA	Workforce Development Authority
WHS	Work Health & Safety
PV	Photovoltaic
NST1	National Strategic Transformation
TVET	Technical Vocational Education and Training
RTB	Rwanda TVET Board

Acknowledgments

RwandaTechnical Vocational and Training Board (RTB) wishes to extend its gratitude to the following partners, stakeholders and institutions involved in development of this programme including private sector, government institutions and other professionals.

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2. General modules

#	**Names**	**Organization**	**Position**
1	Dr. UWIMBABAZI RUGANZU Leon Fidele	UR/CST	Lecturer
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14	MWANANGU Theophile	Kirehe District	DDE
15	MUNEZERO Wivine	EFA Nyagahanga	Trainer
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19	NYIRIMANZI Philemon	Kabutare TVET School	Trainer
20	UWAMAHORO Angelique	Kabutare TVET School	Trainer
21	NIRAGIRE Robert	DDE Karongi	Lecturer
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23	SHYAKA Geofrey	IPRC HUYE	Assistant Lecturer
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26	MUSABYEMARIYA Marie Jeanne	GSND Cyanika	DOS/ Trainer
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3. Complentary modules

#	Names	Institution	Position
1	MURWANASHYAKA Abel	GSNDP CYANIKA	Trainer
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4	UWIRAGIYE Antoinette	MPANDA TVET	Trainer
5	DUSABEMARIYA Francine	IPRC Kigali	Assistsnt Lecturer
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7	NDAHAYO Jacques	Nyanza TVET School	Trainer
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9	AKINGENEYE Angelique	ACEJ KARAMA	Trainer
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11	MUHAYIMANA Theoneste	KAYENZI TVET SCHOOL	Trainer
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16	HARERIMANA Charles	COLLEGE LA LUMIERE DE GASHONGA TVET SCHOOL	Trainer
17	KWIZERA INGABIRE Diane	GSNDP Cyanika	Trainer
18	NTIVUGURUZWA J. Berchmas	GIKONKO TVET SCHOOL	Trainer
19	MUTAGANZWA Gilbert	ES RUKARA	Trainer
20	MATATA Jean Bosco	GS ADEBE	Trainer
21	MUKAMULIGO Candide	St Joseph Primary School	Trainer
22	MBUGUJE Bienvenu	IPRC Ngoma	Trainer
23	TINDO Francois Xavier	Collegio Santo Antonio Zaccaria	Trainer
24	ZIRIMWABAGABO Jean Pierre	Lycee Catholique St Alain Mataba	Trainer
25	KAREKEZI Dieudone	IPRC Musanze	Trainer
26	HAKIZIMANA Joseph	Marie Dominic Mazzarello	Trainer
27	NDIKUBWIMANA Faustin	IPRC Kigali/Tss	Trainer

FOREWORD

The global rapid changes in the labour market tends do call for appropriate training and skills development through outcome-based training approaches. Skills development and employment promotion are central to Rwanda's transformative Vision 2050, aiming to secure high standards of living for all Rwandans. In a bid to transform Rwanda into a knowledge based economy, the National Strategic Transformation 1(NST1) calls socio-economic transformation through TVET skills development. The Rwanda TVET Board (RTB) was established to promote quality education in technical and vocation education and training from level one (1) to five (5) aimed at fast tracking socio-economic development of the country. Designing and distributing curricula, teaching materials, trainer's guides, methodologies and establish training methods for technical and vocation education and training from level one (1) to five (5); is among other RTB's responsabilities

The existing curricula were limited and narrowed in terms of acquired skills and knowledge and were not meeting the requirements of the current labour market at both national and regional level. In addition there were. Barriers in vertical mobility and pathways in TVET which resulted in negative TVET perception. Furthermore, the were barriers to admission of TVET graduates of certain programs into higher learning institutions.

The TVET modernization process has begun with a clear picture of the programs focusing on Renewable sector with the high employment potential like Electrical technology among others. In this respect, Rwanda TVET Board, is honoured to avail the revised level 3 curriculum in Electical technology which serves as the official document and respond to the above mentioned concerns.

With the help of the training providers, trainers, parents whose role is central to the success of this curriculum, the trainees will gain appropriate hand on skills which will make a difference not only to their own lives but also to the success of Rwanda's economy.

I wish to sincerely extend my appreciation to the people who contributed towards the development of this document.

Dipl. - Eng. Paul UMUKUNZI

Director General/ RTB

1. GENERAL INTRODUCTION

The curriculum presents a coherent and significant set of competencies to perform the occupation of a **Domestic Electrical Technician.** It is designed with an approach that takes into account the training needs, the work situation, as well as the goals and the means to implement the training.

The modules of the curriculum include a description of the expected results of the training. They have a direct influence on the choice of the theoretical and practical learning activities. The competencies are the targets of the training: the acquisition of each is required for certification.

The curriculum is the reference to carry out the assessment of learning. Assessment tools of learning are developed based on this document.

The curriculum consists of three parts. The first part is of general interest and shows the nature and goals of the program and the key concepts and definitions used in the document. The second part presents the qualification, its level in the qualification framework, its purpose, its rationale and the list of modules it comprises. The third part deals with the training package. It includes the competencies chart, the sequencing of module learning, the description of each module and the course structure.

The pages describing the modules are the heart of a curriculum. They present the title of the module, the length of training, the amount of credits, the context in which the competency is performed, the prerequisite competencies, the learning units and the performance criteria.

In each module, a course structure is provided. The course structure describes the learning outcomes (knowledge, skills and attitudes) and the learning contents related to each learning unit. In addition, the learning activities and resources for learning are suggested.

Finally, the assessment specifications and guidelines are included in each module.

2.4 . Rationale of the qualification

The Government of Rwanda through ministry of education is committed to meet the universal electricity access by 2024 and mobilize related funds to implement the target. He noted that "The installed capacity increased from 97MW in 2010 to currently 225MW with more than 300MW expected to be on grid by 2024. To achive this taget, the ministry in charge of energy set mission the following objectives: "(a) To make sure sufficient, reliable and affordable energy supplies are available to all the population in Rwanda, (b) To set up and promote an enabling environment for increased private sector participation in energy supply and service provision, (c) Encouraging and incentivizing more rational, efficient use of energy in public institutions, and amongst industrial and household end-users, (d) Ensuring the sustainability of energy exploration, extraction, supply, and consumption so as to prevent damage to the environment and habitats, (e) Promoting safe, efficient, and competitive production, procurement, transportation, and distribution of energy, and (f) Developing the requisite institutional, organizational, and human capacity to increase accountability, transparency, national ownership and decentralized implementation capacity for sustainable energy service delivery. It is against this background, RTB supported by CSC Koblenz aim to develop level 3 curriculum in electrical technology, in order to generate skilled labor force necessary in energy sector.

2. QUALIFICATION DETAILS

2.1. Description

Title:	TVET Certificate 3 in Electrical Technology
Level:	RQF Level 3
Credits:	120
Sector:	Energy
Trade:	Electrical technology
Issue date:	May 2022

2.2. Graduate profile

This qualification provides the skills, knowledge, and attitude for a learner to be competent in a range of routine tasks and activities that require the application of practical skills in a defined context. Work would be undertaken in various Electrical companies where different Domesticl Electrical installation, Electrical maintenance and reparation of electrical appliance works are carried out. Learners may work with some autonomy or in a team but usually under close supervision.

At the end of this qualification, qualified learners will be able to:

1. Describe the occupation and learning process
2. Maintain SHE at workplace
3. Apply computer literacy
4. Communicate simply using English in familiar situations
5. Gukoresha ikinyarwanda kiboneye
6. Pratiquer l'activité de communication en franaçais dans le métier
7. Citizenship
8. Create a business
9. Co-curricula activities (Sport, Religion, Library research, Self-studies)
10. Integrate the workplace
11. Apply algebra and trigonometry
12. Apply general physics
13. Apply fundamental of electricity and electronics
14. Apply bench work to domestic electricity
15. Perform domestic electrical drawing
16. Perform Domestic Electrical Maintenance and Repair Domestic Appliance
17. Lay electrical conduit systems

18. Perform wiring / cabling
19. Install electrical lighting and power sockets
20. Apply Fundamental of Electricity and Electronics
21. Install power protection systems
22. Install Automatic Electrical Switches and Detectors
23. Install Photo Voltaic Home System

2.4 Minimum entry requirements and pathways

The minimum entry requirement to this course is to be mentally fit with an interest in Electrical technology and related areas.

Pathways into the qualification

Pathways from the qualification

Preferred pathways for candidates entering this qualification include:

- To have completed 9 Years Basic Education with Outstanding performance in National examination of Ordinary Level in the following subjects: Mathematics and physics which are considered as key prerequisites.
- A range of other related qualifications equivalent to 9 Years Basic Education with Outstanding performance in the following subjects: Mathematics and Physics which are considered as key prerequisites.

Progression route of candidates achieving this qualification include:

- TVET Certificate IV in electrical technology
- A range of other related TVET Certificate IV qualifications.

2.5 Job related information

This qualification prepares individuals to integrate the agriculture industry with the professionalization of electrical technology . This qualification again offers the opportunity to execute the works as domestic electrical installation, domestic electrical maintenance, domestic electrical appliances reparation while ensuring that safety, security and environmental regulations are respected.

Possible jobs related to this qualification

Domestic electrical installer
Domestic electrical maintenance technician
Domestic electrical appliances repairer

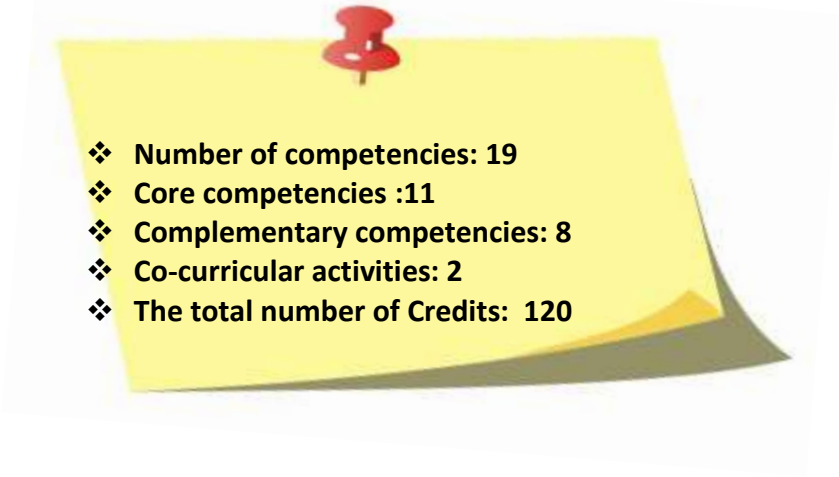
2.6 Information about competencies

No	Code	Complementary competencies	Credit
1	CCMOL302	Describe the occupation and learning process	3
2	CCMHE302	Maintain SHE at workplace	3
3	CCMCL302	Apply computer literacy	3
4	CCMEN302	Communicate simply using English in familiar situations	3
5	CCMKN302	Gukoresha Kinyarwanda kiboneye	3
6	CCMCB302	Create a business	3
7	CCMFT302	Pratiquer l'activité de communication en français dans le métier	3
8	CCMCZ301	Comply with Citizenship values	3
Total			24

No	Co-Curricular activities	Credit
1	**Sports/Clubs**	1
2	**Self-study/Library Reasearch**	1
Total		2

	No	Code	Core competencies	Credit
GENERAL		**GENAT302**	Apply Algebra and trigonometry	6
		GENAP302	Apply General Physics	4
		ELTBE301	Apply bench work to domestic electricity	6
		ELTDE301	Perform domestic electrical drawing	7
		ELTFE301	Apply Fundamental of Electricity and Electronics	7
SPECIFIC		**ELTEM301**	Perform Domestic Electrical Maintenance	9
		ELTIEC301	INSTALL ELECTRICAL LIGHTING AND POWER SOCKETS	10
		ELTPP301	Install power protection system	9

	ELTAE301	Install Automatic Electrical Switches and Detectors	**9**
	RENPV301	Install Photo Voltaic Home System	**7**
	ELTIA302	Integrate the workplace	**20**
	Total		120



2.8 Allocation of Learning Hours

N0	Module name	Learning outcome	Theoretical hours	Practical hours	Total hours After adjustment
1	**Domestic Electrical Maintenance**	LO1: Perform electrical installation maintenance activities	**9**	**21**	**30**
		LO2: Inspect and test domestic electrical appliances	**3**	**7**	**10**
		LO3:Perform kettle repairing actitivities	**3**	**7**	**10**
		L04: Perform iron repairing actitivities	**3**	**7**	**10**
		L05: Perform cooker repairing activities	**3**	**7**	**10**
		L06: Perform fridge reparing activities	**3**	**7**	**10**
		LO7: Perform water heater repairing activities	**3**	**7**	**10**
Total hours			**27**	**63**	**90**
2	**Electrical lighting and power socket**	LO1: Conduct site installation survey	**2**	**3**	**5**
		LO2: Lay electrical conduits systemes	**6**	**14**	**20**

		LO3: Perform wirring/cabling	6	14	20
		LO4:Install electrical lighting and power socket	15	35	50
		LO5: Clean working area	2	3	5
Total hours			**31**	**69**	**100**
3	**Protection system installation**	LO1: Explain protective devices	**5**	**10**	**15**
		LO2: . Fix distribution board and connect protective devices	**6**	**14**	**20**
		LO3: Create earthing protection system	**6**	**14**	**20**
		LO4: Install surge arrestor and lightening arrestors	**6**	**14**	**20**
		LO5: . Develop as built in report	**5**	**10**	**15**
Total hours			**28**	**62**	**90**
4	**Photovoltaic home system installation**	LO1: Design solar PV system	**5**	**10**	**15**
		LO2: Perform site setting	**5**	**10**	**15**
		LO3: Mount Solar PV panels	**6**	**14**	**20**
		LO4: Interconnect the PV system components	**3**	**7**	**10**
		LO5: connect protective devices	**3**	**7**	**10**
Total hours			**22**	**48**	**70**
5	**Automatic electrical switches and detectors installation**	LO1: Identiy automatic electri switches and detectors	**7**	**18**	**25**
		LO2: connect automatic electric switches and detectors	**15**	**35**	**50**
		LO3: Test system functionality	**5**	**10**	**15**
Total hours			**27**	**63**	**90**
6	**Apply bench work to domestic electricity**	LO1: Operate measuring and marking tools	**6**	**14**	**20**
		LO2: Operate striking and holding tools	**3**	**7**	**10**
		LO3: Operate cutting tools	**5**	**10**	**15**

		LO4: Operate power tools	**5**	**10**	**15**
Total hours			**19**	**41**	**60**
7	**Perform domestic electrical drawing**	LO1: Use Technical drawing instruments, materials and equipmen	**3**	**7**	**10**
		LO2: Draw lines and symbols used in electrical drawing	**6**	**14**	**20**
		LO3: Perform drawing projections	**5**	**10**	**15**
		LO4: Draw electrical diagrams	**7**	**18**	**25**
Total hours			**21**	**49**	**70**
8	**Apply Fundamental of Electricity and Electronics**	LO1: Interpret basic concepts in electricit	**5**	**10**	**15**
		LO2: Analyze characteristics of AC signal	**5**	**10**	**15**
		LO3: Study the behavior of different AC circuit	**5**	**15**	**20**
		LO4: Apply electronic components	**5**	**15**	**20**
Total hours			**20**	**50**	**70**
			195	**455**	**640**

3. TRAINING PACKAGE

The training package includes the competencies chart, the flowchart, the modules, the course structure, and the assessment guidelines.

3.1 Course structure

The course structure describes the learning outcomes for each learning unit. These learning outcomes are the essential skills and knowledge to be acquired. The contents to be covered for each learning outcome are prescriptive. The Learning Activities contain a series of suggestions, usually with several options, that will guide the learner and the trainer.

3.2 Flowchart

The flowchart of sequencing of learning is a schematic representation of the order of acquisition of the competencies. It provides an overall planning of the entire training programme and shows the relationship between the modules. This type of planning is to ensure consistency and progression of learning. For each module, the flowchart shows the learning that is already in place, the learning that is to take in parallel or later. The positions defined will have a decisive impact on all subsequent pedagogical choices. The flowchart of the sequence of learning of the modules of the training programme is presented on the following page.

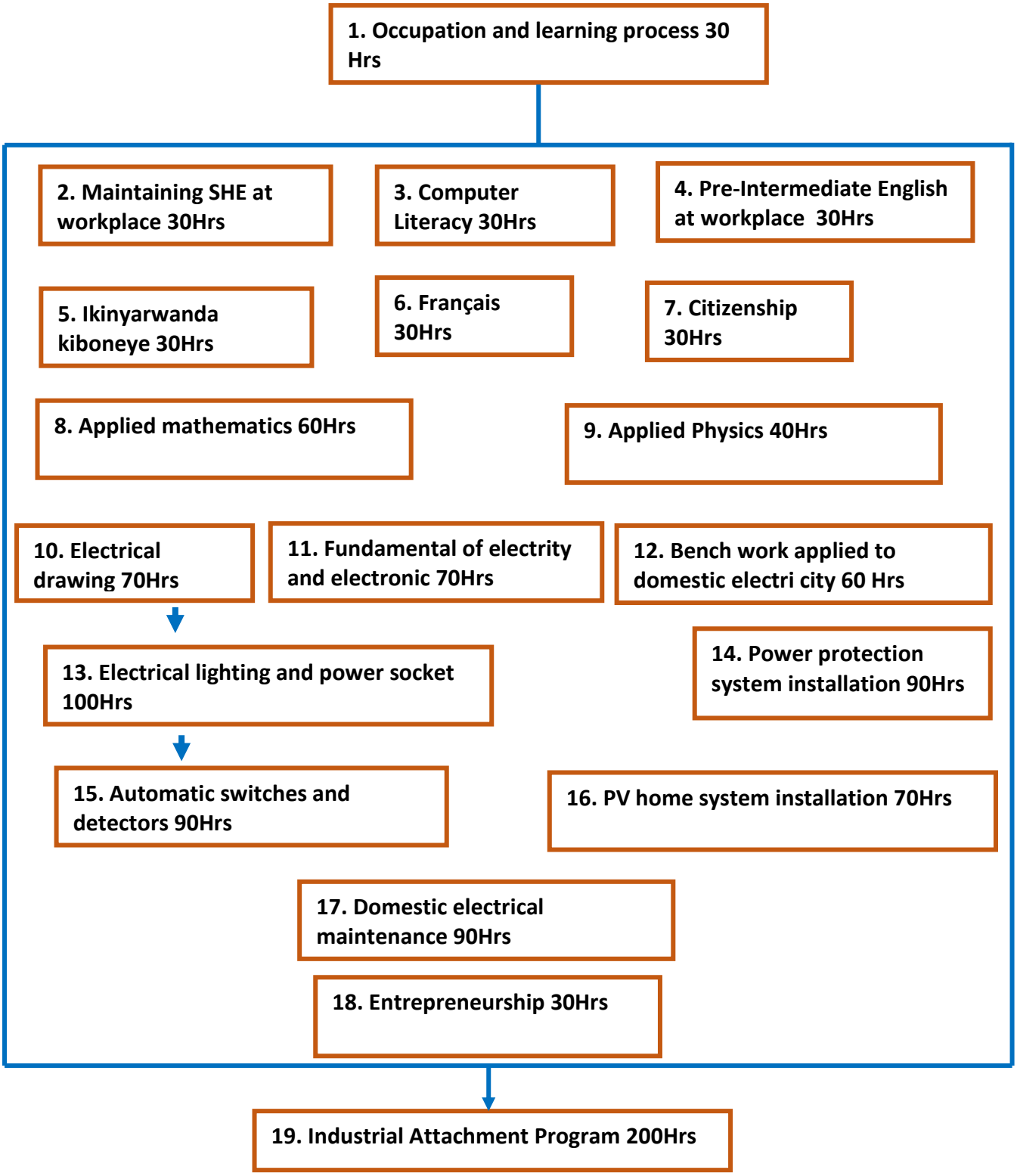


Figure 2: Flowchart

4. ASSESSMENT GUIDELINES

4.1 Assessment Methodology

To assess knowledge, practical, and application skills through a jury system of continuous evaluation that encourages learners to display understanding of the principles in application to set practical tasks and their attendant theory to assess self-learning.

There are two types of assessment (Formative Assessment and Summative/Integrated Assessment). Each assessment has its own rule for passing to be declared competent.

4.2 Formative Assessment

This is applied on all types of modules (e.g. Complementary, General and Specific modules)

A trainee to be competent for a formative module must have at least 70%

A trainee to be eligible to undertake integrated assessment of specific modules must have at least 50% as passing line for general and complementary modules.

Each trainee should be competent on all formative assessments to be declared competent on that module

All formative assessment should be declared competent before taking the summative/integrated assessment

4.3 Summative Assessment

All Summative/Integrated assessment should match with the content of the module in the curriculum. Summative/Integrated Assessment is always in practical, giving it as a theoretical type of assessment is not acceptable.
The integrated situation provided in the curriculum is a sample of the assessment to be carried out, the Trainer/Teacher has the role of developing another one referring to the task to be carried out in the integrated situation in accordance to the circumstances inside school, but the integrated situation should stick on the components of a task.
During Summative/Integrated assessment, assessor panel members should be three (3).

The trainee can be declared competent based on the assessment CRITERIA and its respective assessment indicators

The Passing Line for the modules is:

- 50 % for general and complementary modules
- 70 % for specific modules

<table>
<tr><th colspan="2">Training delivery</th><th>100%</th><th colspan="2">Assessment</th><th>Total 100%</th></tr>
<tr><td colspan="2">Theoretical content</td><td>30%</td><td rowspan="4">Formative assessment</td><td>30%</td><td rowspan="4">50%</td></tr>
<tr><td colspan="2">Practical work:</td><td rowspan="3">70%</td><td rowspan="3">70%</td></tr>
<tr><td>Group project and presentation</td><td>20%</td></tr>
<tr><td>Individual project /Work</td><td>50%</td></tr>
<tr><td colspan="3"></td><td colspan="2">Summative Assessment</td><td>50%</td></tr>
</table>

Note:

1. Summative assessment is always conducted at the completion of module delivery. It should be practical through an integrated situation for specific modules and in any other forms of assessment for complementary and general modules.

2. Learning hours assigned to specific module includes the duration assigned to integrated assessment

GLOSSARY

1. **Assessment**: A process of gathering and judging evidence in order to decide whether a person has attained a standard of performance.
2. **Assessment criteria:** Statements which describe performances and place them in context with sufficient precision to allow valid and reliable assessment.
3. **Best practice:** Management practices and work processes that lead to outstanding or top-class performance and provide examples for others.
4. **Competency standard:** An industry-determined specification of performance which sets out the skills, knowledge and attitudes required to operate effectively in employment. Competency standards are made up of units of competency, which are themselves made up of elements of competency, together with performance criteria, a range of variables, and an evidence guide.
5. **Competency**:means the ability to apply knowledge, skills and personal, social and methodological skills in the workplace or during learning, as well as in personal and professional development. This ability or capacity is acquired through leaning, exposure to the tasks and series of training allowing one to perform specific task autonomously. Reason why in the context of the CBE Framework competencies are described as responsibility and independence.
6. **Competency-based assessment (or CBA):** The gathering and judging of evidence in order to decide whether a person has achieved a standard of competency.
7. **Complementary competencies:** Set of knowledge, skills and attitudes which are not directly linked to a specific occupation or industry, but which are important for work, education and life in general, such as communication, mathematics, organizational aptitude, and computer literacy, interpersonal and analytical competency.
8. **Core modules:** Modules leading to competencies' acquisition that an industry sector has agreed upon as essential for a person to be accepted as competent at a particular level. All modules may be core, but in many cases competency at a level will involve core modules plus optional or specialization modules. Core competencies are normally those central to work in a particular industry.
9. **Credential:** Formal certification issued for successful achievement of a defined set of outcomes, e.g. successful completion of a course in recognition of having achieved particular knowledge, skills or competencies; successful completion of an apprenticeship or traineeship.

10. **Credit**: The acknowledgement that a person has satisfied the requirements of a module.
11. **Curriculum:** The specifications for a course or subject (module) which describe all the learning experiences a learner undergoes, generally including objectives, content, intended learning outcomes, teaching methodology, recommended or prescribed assessment tasks, assessment exemplars, etc.
12. **Evidence guide:** The part of a competency standard which provides a guide to the interpretation and assessment of the unit of competency, including the aspects which need to be emphasized in assessment, **relationships to other units, and the required evidence of competency.**
13. Flexible delivery: A range of approaches to providing education and training, giving learners greater choice of when, where and how they learn. Flexible delivery may involve distance education, mixed-mode delivery, online education, self-paced learning, self-directed learning, etc.
14. **Formal education:** Also formal training education or training provided in educational institutions such as schools, universities, colleges, etc. or off the job in a workplace, usually involving direction from a teacher or instructor.
15. **General competencies:** competencies correspond to larger operations that go beyond the tasks, but generally contribute to their implementation. These activities require more fundamental learning and are generally common to several tasks and transferable to many work situations.
16. **Generic modules**: Modules leading to the attainment of complementary competencies.
17. **Informal education:** The acquisition of knowledge and skills through experience, reading, social contact, etc.
18. **Internship**: An opportunity for a learner to integrate career related experience by participating in planned, supervised work.
19. **Key competencies:** Any of several generic skills or competencies considered essential for people to participate effectively in the workforce. Key competencies apply to work generally, rather than being specific to work in a particular occupation or industry. The following are key areas of competency which were developed into seven key competencies: collecting, analyzing and organizing information; communicating ideas and information; planning and organizing activities; working with others and in teams; using mathematical ideas and techniques; solving problems; and using technology.
20. **Knowledge:** means the result of the adoption of information through the learning process. Knowledge is a set of facts, principles, theories and practices

related to area of work or study. In CBE context lifelong learning knowledge is described as theoretical and / or factual.

21. **Learning outcomes**: are statements of what learner knows, understands and can perform, based on the completion of the learning process, defined by knowledge, skill and competency.
22. **Learning activities:** Suggested activities that can be developed during lesson planning and activity preparation. The choice of learning activities must be tailored according to group size, available material resources and communication tools.
23. **Learning hours:** Amount of hours required to acquire the competency, including the time allocated to evaluation, which is estimated between 5 and 10% of the total learning time of the competency.
24. **Learning outcomes:** Statements that indicate what learners will know or be able to do as a result of a learning activity. Learning outcomes are usually expressed as knowledge, skills, or attitudes.
25. **Learning unit:** Any of the basic building blocks of a module, which describes the key activities or the elements of the work covered by the module
26. **Module**: A unit of training which corresponds to one competency and which can be completed on its own or linked to others.
27. **Occupation**: The principal business of one's life.
28. **Performance criteria** The part of a competency standard specifying the required level of performance in terms of a set of outcomes which need to be achieved in order to be deemed competent. It describes the quality requirements of the result obtained in labor performance.
29. **Qualification**: means the formal name for the result of a process of assessment and validation, which is obtained when a competent body determines that an individual has achieved learning outcomes to the standards laid down.
30. **Quality assurance:** The systems and procedures designed and implemented by an organization to ensure that its products and services are of a consistent standard and are being continuously improved.
31. **Recognition of prior learning (or RPL):** The acknowledgement of a person's skills and knowledge acquired through previous training, work or life experience, which may be used to grant status or credit in a subject or module.
32. **Skills:** are the ability to apply knowledge and use the principle of "know how" to perform a specific task and to solve the problem. In the context of the CBE Framework, skills are defined as cognitive (involving the use of logical, intuitive and creative thinking), practical (including physical skill and use of methods, materials, devices and instruments) and social skills (communication and cooperation

skills, emotional intelligence and other).

33. **Specific competencies:** Competencies that are directly related to the tasks of the occupation in the workplace context. They refer to concrete, practical, and focused aspects
34. **Traineeship:** A system of vocational training combining off-the-job training at an approved training provider with on-the-job training and practical work experience. Traineeships generally take one to two years and are now a part of the New Apprenticeships system.
35. **Unit of competency:** A component of a competency standard. A unit of competency is a statement of a key function or role in a particular job or occupation. See also element of competency, performance criteria, range of variables.

Employable Skills for Sustainable Job Creation

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