

	BQA NCQF QUALIFICATION TEMPLATE	Document No.	DNCQF.QIDD.GD02
		Issue No.	01
		Effective Date	04/02/2020

SECTION A: QUALIFICATION DETAILS													
QUALIFICATION DEVELOPER (S)		BOTHO UNIVERSITY											
TITLE	Certificate in Electrical installation and maintenance										NCQF LEVEL	5	
FIELD	Manufacturing, Engineering and Technology			SUB-FIELD		Electrical Engineering				CREDIT VALUE	140		
New Qualification						☒		Review of Existing Qualification					
SUB-FRAMEWORK		General Education			☐		TVET			☒		Higher Education	
QUALIFICATION TYPE	Certificate	I	II	III	IV	V	☒	Diploma	Bachelor				
	Bachelor Honours			Post Graduate Certificate				Post Graduate Diploma					
	Masters					Doctorate/ PhD							
RATIONALE AND PURPOSE OF THE QUALIFICATION													
Rationale: Botswana is a fast-developing country, where electricity plays a vital role. Due to the increasing number of industries, mines, development in the infrastructure and rural electrification, the demand for electricity has increased abundantly in recent times. To fulfill the demand for electricity, new power plant was constructed in Morupule. The Botswana government is also promoting the usage of renewable energy in generation of electricity and is planning to install a number of solar energy power plants in the country (https://www.export.gov/article?id=Botswana-Energy), hence the need for more skilled electrical workers. This													

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qualification will therefore ensure a steady supply of graduates equipped with the knowledge and skills to work as maintenance technician, wireman, electrical contractor and supervisor.

Botswana seeks among other development imperatives to be an innovative, prosperous and productive nation with a youth endowed with technical skills and competencies. Furthermore, and through its Vision 2036 Botswana envisages to be a knowledge economy aligned with the global agenda for sustainable development. This qualification forms part of the foundation for the realization of the aforementioned vision by providing the nation with competent electrical artesians.

The Human Resources Development Council (HRDC) *Priority skills (Current and Future)* document articulate the need for human resources in Electrical technician. The occupations related to the Electrical installation and maintenance qualification which are mentioned in the HRDC document are Electrical and Electronic Equipment assemblers and Electrical technicians. This qualification graduates are equipped to work in the above-mentioned occupations.

A detailed market survey was conducted to establish the need to offer a certificate in Electrical installation and maintenance qualification and to determine the viability of the qualification in line with industrial and business trends. The responses from the survey were positive with an inkling that this qualification is indeed needed and is sustainable.

There is also a high demand for Electrical artesians around the globe, due to industrialization, electrification and innovation in the field of Electrical Engineering practices.

PURPOSE:

The aim of this qualification is:

- to produce graduates with a broad technical knowledge and understanding of underlying concepts and principles of electrical installation and maintenance.
- to acquire skills in designing electrical layouts, assembling, installing, diagnosing faults, and maintaining electrical systems, components, controls, and fixtures.
- to come up with solutions to real life problems and challenges that beset the country such as youth unemployment, poverty, and inequality.

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- to be artisans, demonstrate autonomy, accountability, start new business plans and supervise works.

ENTRY REQUIREMENTS (including access and inclusion)

Entry into this qualification is through any one of the following requirements:

- 1) JEC / equivalent with minimum pass (D) in 3 subjects.
- 2) Certificate IV, NCQF level 4 (General Education or TVET) or Certificate III, NCQF level 3 (General Education or TVET) with Recognition of Prior Learning equivalent to at least 40 credits at NCQF level 4.
- 3) Applicants that do not meet the above criteria but possess relevant industry experience may be considered through recognition of prior learning (RPL).

SECTION B

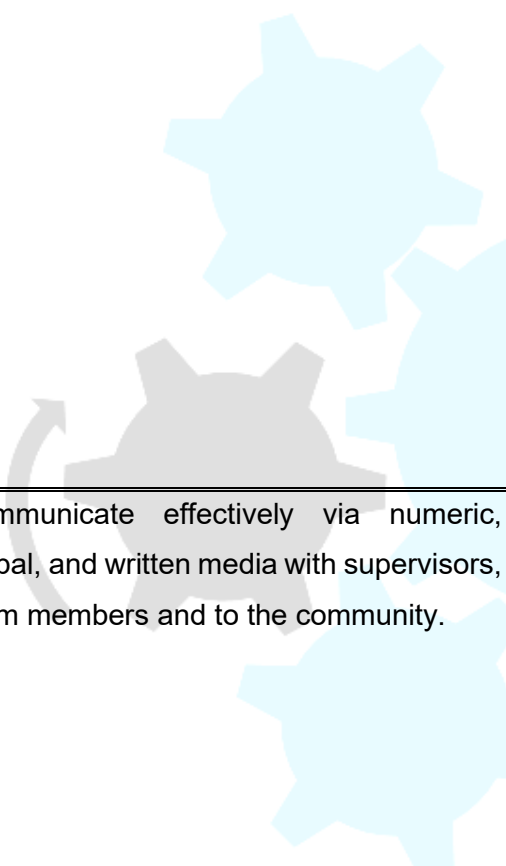
QUALIFICATION SPECIFICATION

GRADUATE PROFILE (LEARNING OUTCOMES)	ASSESSMENT CRITERIA
1) Plan and design electrical wiring layouts to install electrical systems, components, controls, and apparatus.	1.1. Plan electrical wiring layouts for installing electrical systems, components, controls and apparatus. 1.2. Design electrical wiring layout for installing electrical systems. 1.3. Outline the methodologies used in designing wiring layouts. 1.4. Apply electrical wiring skills in designing electrical layouts

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2) Assemble and install electrical or electronic wiring components, equipment, appliances, and fixtures using engineering methods, tools and skills.	2.1. Apply the skills in assembling electrical or electronics wiring components and equipment. 2.2. Demonstrate skills in installing electrical and electronic equipment, appliances, and fixtures. 2.3. Evaluate the procedures to be followed in using hand tools and power tools. 2.4. Apply the procedures to be followed in assembling and installing electrical and electronic equipment.
3) Diagnose malfunctioning or defective electrical systems, controls, apparatus, and components.	3.1. Identify the malfunctioning electrical systems, controls, apparatus, and components. 3.2. Apply skills in using test equipment and hand tools. 3.3. List the methodologies used in locating malfunctioning electrical systems. 3.4. Identify the cause for breakdown in electrical systems. 3.5. Interpret the cause for breakdown as a report.
4) Inspect and maintain electrical systems, controls, apparatus, and components.	4.1. Apply skills in inspecting electrical systems, equipment, and components. 4.2. Identify hazards and defects in electrical systems. 4.3. Write a report on the identified hazards and defects. 4.4. Record the need for adjustment or repair of electrical systems. 4.5. Apply the skills to rectify malfunctioning of electrical systems, controls and components.
5) Facilitate teamwork to effectively execute electrical Installation and maintenance	5.1. Work independently and as a member of a team in various project environments. 5.2. Demonstrate leadership skills.

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		5.3. Organise and manage projects. 5.4. Mentor and train team members. 5.5. Build and maintain relationships, respect, and trust with team member. 5.6. Ensure that different social and cultural values are taken into account when dealing with colleagues, clients and stakeholders. 5.7. Effective documentation team contributions emanating from discussions and meetings. 5.8. Demonstrate effective communication with team members.
	6) Communicate effectively via numeric, verbal, and written media with supervisors, team members and to the community.	6.1. Evaluate the various communication methods. 6.2. Prepare and present cost estimates, work schedules and instruction manuals. 6.3. Demonstrate effective communication skills 6.4. Prepare and interpret Electrical installation drawings and specifications. 6.5. Ensure correct interpretation of instructions 6.6. Ensure that clear instructions are given to subordinates using appropriate language and communication aids. 6.7. Oral presentations are made using language, structure, style, visual media and supporting documents appropriate to the audience and purpose.
	7) Demonstrate knowledge of management skills for an engineering practice.	7.1. Demonstrate leadership skills. 7.2. Demonstrate effective communication with team members and stakeholders. 7.3. Recognise and discharge responsibilities to the workers.

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	7.4. Apply knowledge in preparing budget. 7.5. Prepare quotation to tender projects. 7.6. Apply skills in preparing files and documenting the records.
8) Take responsibility for exercising judgment commensurate with knowledge and experience.	8.1. Adhere to engineering code of conduct. 8.2. Demonstrate the ability to take responsibility for consequences stemming from individual actions and/or teamwork. 8.3. Make decisions within electrical installation or related fields. 8.4. Describe the ethical implications of engineering decisions in terms of trustworthiness, the impact on the environment, business, and economy.
9) Reason critically and evaluate the relevant quality, safety, health and environmental standards.	9.1. Adhere to the relevant electrical code conduct. 9.2. Ensure that relevant standards are known, understood, and applied in context. 9.3. Make sure that changes in procedures and processes are implemented and followed 9.4. Ensure that quality manuals are maintained and used appropriately.

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SECTION C		QUALIFICATION STRUCTURE				
COMPONENT	TITLE	Credits Per Relevant NCQF Level				Total (Per Subject/ Course/ Module/ Units)
		Level [4]	Level [5]	Level [6]	Level [7]	
FUNDAMENTAL COMPONENT Subjects/ Courses/ Modules/Units	Technical Mathematics	---	10	---	---	10
	Engineering Physics	10	---	---	---	10
	Basic Professional Studies	---	20	---	---	20
	Occupational health and Safety practice	10	---	---	---	10
CORE COMPONENT Subjects/Courses / Modules/Units	Fundamentals of Electrical and Electronics Engineering	---	10	---	---	10
	Electrical Wiring and assembling	---	10	---	---	10
	Engineering Drawing and Workshop practice	---	10	---	---	10
	Electrical machines and protection switches	---	10	---	---	10
	Electrical wiring design installation and maintenance	---	20	---	---	20
	Industrial Training	---	30	---	---	30
ELECTIVE/ OPTIONAL COMPONENT Subjects/Courses / Modules/Units						

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SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	Credit Value
Level 4	20
Level 5	120
TOTAL CREDITS	140

Rules of Combination:
(Please Indicate combinations for the different constituent components of the qualification)

Certificate in Electrical Installation and maintenance qualification will have 140 credits and take one year to complete under the normal full-time mode of study.

- The credit combination for this qualification is 50 credits from fundamental components and 90 credits from core components.

ASSESSMENT ARRANGEMENTS

This qualification is assessed as follows:

Formative assessment: 40%

Summative assessment: 60%

Assessment Types:

- Practical test
- Class assignments
- Presentations

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- Informal class tests
- Formal modular tests

Summative assessment:

Assessment, focusing on the achievement of the exit-level outcomes, will be done by means of a written or practical examination (of at least 2 - 3 hours) at the end of every module.

Industrial training: All students must undergo a industrial training under a supervisor who monitors students' workplace performance using a weekly logbook and submits a final evaluation report to the tutor (20%). A tutor assigned to a student visits the intern twice at workplace, each time making his/her evaluation (15%). At the end of the professional practice, a student will submit a project report (50%). All the marks, namely from tutor visits, supervisor evaluation and project report evaluation will be captured in a form called 'internship report feedback form'.

Pass requirements:

A learner qualifies for the Certificate Level V in Electrical Installation and Maintenance degree on NCQF level 5 when he/she passes all required individual modules. A student passes a module if he/she obtains a final mark of 50% or more in the module. The final mark is constituted of formative assessments (40%) and the summative assessment (60%). The final mark for the qualification is calculated by averaging the marks obtained in the various modules. The student must successfully complete 140 credits to complete the qualification.

MODERATION ARRANGEMENTS

Moderation of assessments focuses on:

- Ensuring that the assessment is aligned to the module objectives and the learning outcomes.
- Ensuring that the assessment is consistent on all levels within the institution and does not show any bias or academic disregard and that it is immune to all forms of prejudice.

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- c) Ensuring that the level of assessment appropriately matches the students' level of study i.e. the assessments remain viable, relevant and provide an accurate judgement of a student's achievements and level of knowledge.
- d) Maintaining consistency in the marking process.

Pre-assessment Moderation:

This moderation is carried before assessment tasks are given to students. All submitted sets of question papers & marking keys are shared with the moderators. Each assessment pack should be moderated by two Moderators where possible. The question paper moderation report should be filled in for each question paper. Moderator report will be shared with question paper setter so that moderator feedback will be taken into account when finalizing the question paper.

Post-assessment moderation or moderation of marking:

Moderation of completed assessment tasks is categorized as post-assessment moderation. It is carried out after assessment tasks have been marked. The set of answer scripts and marking keys are shared with the moderators. At least 10% of the answer scripts in a module should be moderated during post assessment moderation.

The moderators and assessors are well trained and have registered with BQA. The internal and external moderation will be done in-line with the Moderation policy of the Institution.

RECOGNITION OF PRIOR LEARNING

Candidates may apply the recognition of prior learning whether such learning has been gained through formal study, through workplace learning, or through any other formal or informal means, any candidate applying for recognition of Prior learning (RPL) or credit Accumulation and Transfer (CAT) will be expected to provide evidence of such learning that must be relevant, sufficient, valid, verifiable and authentic. Provision of RPL for award of the qualification will be in line with the National RPL policy.

CREDIT ACCUMULATION AND TRANSFER

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A clear framework through which students can accumulate learning credits and transfer such credits toward appropriate qualifications helps to validate and recognize learning gained through formal and informal means, provides flexibility to students, and allows students to progress relatively seamlessly through their lifelong learning journey. Credit transfer Will be applied in line with National Credit Accumulation and Transfer (CAT) Policy.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Learning Pathway:

Completion of a Certificate V meets the requirement for admission to a Diploma (NCQF level 6) or a Bachelor's degree (NCQF level 7) in Electrical Engineering, Electrical and Electronics Engineering, Computer Engineering, Electronics and Communication Engineering, Civil Engineering, Mechanical Engineering, Electrical and Instrumentation Engineering, Automobile engineering and Aeronautical Engineering.

Employment Pathway:

The graduates of this qualification will be competent enough to find employment in both public and private sector as electrical maintenance artisans, wireman, electrical contractor and installation artisans in heavy machine manufacturing industry, small scale industry, power plants, power grids, Control instrumentation manufacturing industry, electromedical field, transport sector and electronic industry.

QUALIFICATION AWARD AND CERTIFICATION

The learner will be awarded 'Certificate in Electrical installation and maintenance', after attaining a minimum of 140 credits as specified in the rule of combination and credit distribution. If the candidate does not meet the prescribed minimum value of the qualification, then the student will exit with a transcript.

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REGIONAL AND INTERNATIONAL COMPARABILITY

This qualification was compared with various institutions running similar qualification. The following institutions and their qualification were used as comparisons:

- **Bradford College (UK):** Electrical and Electronic Engineering Extended Certificate
- **Universal College of Learning (New Zealand):** Certificate in Electrical engineering (Advanced trade) Level 5
- **City and Guild-** Certificate in Electrical and Electronics Engineering

Similarities with:

Bradford college

- This qualification and Bradford College offers introduction course to Engineering. This qualification offers Fundamentals of Electrical and Electronics, whereas Bradford College offers Engineering principles.
- Both qualifications run for a duration of 1 year.
- Both the qualification does not offer elective modules.

Universal College of Learning

- This qualification and University College of learning offers introduction course to Engineering. This qualification offers Fundamentals of Electrical and Electronics, whereas University College of learning offers Electrical Standards and Statutes
- This qualification and University College of learning offers introduction course to professional skills. This qualification offers Basic Professional studies, whereas University College of learning offers Business Financial skills.
- This qualification and University College of learning offers Electrical wiring and assembling module.
- This qualification offers Electrical Wiring Design installation and Maintenance, whereas University College of learning offers Electrical installation and maintenance.

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- Both the qualification offers Occupational health and safety module.
- Both the qualifications focus more on practical modules
- The entry criteria are same for both the qualification. The entry requirement for both the qualification is level 4

City and Guild

- This qualification and the qualification offered by City and Guild have the core components required in the Electrical and Electronic Engineering field. Both qualifications run for a duration of 1 year.
- Both the qualifications have laboratory modules.
- Both the qualification offers Basic electrical engineering modules. This qualification offers Fundamentals of Electrical and Electronics, whereas City and Guild offers Introduction to Electrical Engineering.
- Both the qualification does not offer elective modules.

Differences with:

Bradford college

- This qualification offers a course on Basic Professional Studies, whereas Bradford College qualification does not offer this course.
- This qualification offers core electrical engineering modules like, Fundamentals of electrical and electronics Engineering, Electrical machines and Protection switches and Electrical wiring design installation and maintenance, Whereas Bradford's qualification offers general Engineering modules.
- This qualification focuses more on practical work whereas Bradford College focuses more on design modules.
- This qualification offers a course in industrial training, whereas Bradford College qualification does not offer course in industrial training.
- There are more contact hours in the proposed modules which are an added to advantage to the students. This can benefit the students and will assist their overall understanding of the core modules in the curriculum.

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Universal College of Learning

- This qualification offers core electrical engineering modules like, Fundamentals of Electrical and Electronics Engineering, and Electrical machines and protection switches Whereas Universal College of Learning does not offer these modules.
- This qualification offers a course in industrial training, whereas Universal College of Learning qualification does not offer course in industrial training.
- This qualification is offered in full time, whereas Universal College of Learning qualification is offered on part time mode.
- This qualification is offered for a duration of one year, whereas Universal College of Learning qualification is offered for two years
- This qualification does not have elective modules, whereas Universal College of Learning qualification offers elective module
- This qualification is offered for 140 credits, whereas Universal College of Learning qualification is offered for 75-82 credits (Varies based on the elective modules)

City and Guild

- This qualification offers a course on Basic Professional Studies, whereas City and Guild does not offer this course.
- This qualification offers a course on industrial training, whereas City and Guild does not offer this course.
- This qualification offers occupational health and safety module were as City and guild does not offer this module.

REVIEW PERIOD

5 Years