

	BQA NCQF QUALIFICATION TEMPLATE	Document No.	DNCQF.P01.GD02
		Issue No.	01
		Effective Date	01.08.2022

SECTION A:	QUALIFICATION DETAILS
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QUALIFICATION DEVELOPER (S)	Botswana International University of Science and Technology (BIUST)
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TITLE	Doctor of Philosophy in Biotechnology	NCQF LEVEL	10
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STRANDS (where applicable)	
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FIELD	Natural, Mathematical and Life Sciences	SUB-FIELD	Biological Sciences	CREDIT VALUE	360
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<i>New Qualification</i>	√	<i>Legacy Qualification</i>
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SUB-FRAMEWORK	<i>General Education</i>	<i>TVET</i>	<i>Higher Education</i>	√
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QUALIFICATION TYPE	<i>Certificate</i>	<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>	<i>V</i>	<i>Diploma</i>	<i>Bachel or</i>
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<i>Bachelor Honours</i>	<i>Post Graduate Certificate</i>	<i>Post Graduate Diploma</i>
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<i>Masters</i>	<i>Doctorate/ PhD</i>	√
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RATIONALE AND PURPOSE OF THE QUALIFICATION

RATIONALE: The achievement of the long-term vision of transforming Botswana to a knowledge-based economy demands among other things, conscious application of science and technology as the major instrument for development. This, in turn, requires strong human resources development policies that focus on science and technology education to train competent and innovative citizens. National Development Plan eleven (NDP 11) identifies among others, low quality in tertiary education as a challenge to Botswana’s developmental advancements or progress. The Human Resource Development Council (HRDC) has identified life sciences as a priority in human resource development need and has recommended an increase in training at postgraduate level. More specifically, the HRDC priority skills 2023/2024 identifies the need for biotechnologists at postgraduate level including doctorate in areas such as agriculture, industry and Health care including

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vaccinologists and biomedical engineers and recommends the development of new programmes and external training to fill the existing gap. Biotechnology is thus considered a leading scientific field that would enable Botswana to harness its rich biological diversity offering immense potential in promoting its agriculture, industry, health care, and environmental protection. Hence, the need for doctoral level training of biotechnologists with advanced knowledge and competence to demonstrate high level of mastery, innovation, autonomy, scholarly and professional integrity is obvious.

PURPOSE: (itemise exit level outcomes)

The purpose of the qualification is to equip graduates with most advanced Knowledge, skills, and competences to:

- apply the most advanced knowledge in the selection of appropriate scientific procedures and research methods or techniques in solving complex problems in biotechnology.
- undertake independent research to make significant contribution to scientific knowledge.
- contribute to education and training at undergraduate and graduate levels.
- effectively communicate most advanced knowledge to a wider audience using appropriate platforms


MINIMUM ENTRY REQUIREMENTS (including access and inclusion)

As a minimum requirement, the applicant should have NCQF Level 9 in the same or similar fields of study (an MSc Degree or equivalent in Biotechnology or related disciplines, such as Genetics, Breeding, Microbiology, Biomedical Science from accredited institution with a research component). To be admitted in the PhD Medical Biotechnology strand, the applicant must have completed the at least five of the following: Genetics/human molecular genetics, molecular biology/cell biology, cancer biology, general/advanced microbiology, general/advanced biochemistry, and bioethics. Recognition of prior learning will be done as described in Section 6. Candidates who do not meet the above minimum entry requirements will be considered through Recognition of Prior Learning (RPL) and Credit Accumulation and Transfer (CAT) as specified in policies by the Education and Training Provider (ETP) in line with the National RPL and CAT policies.

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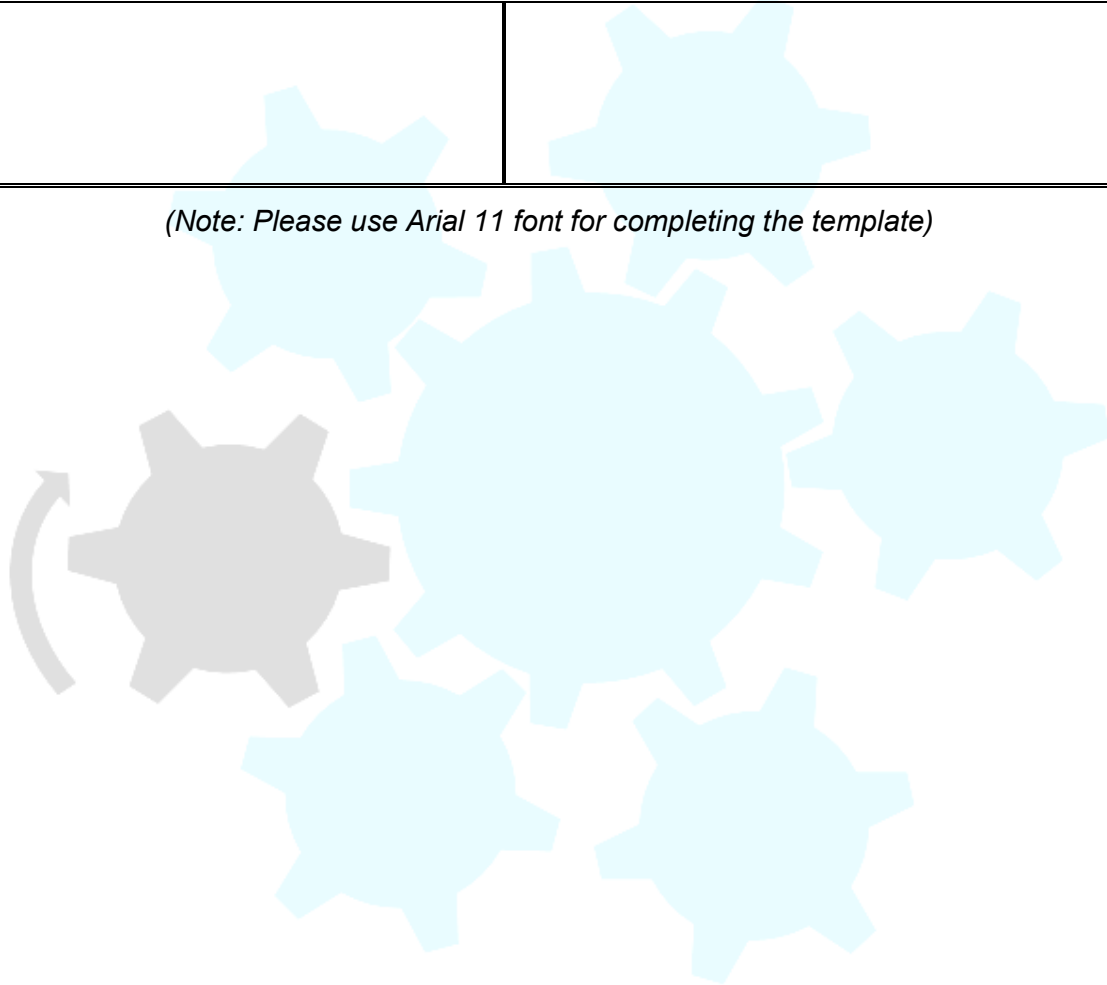
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SECTION B QUALIFICATION SPECIFICATION	
GRADUATE PROFILE (LEARNING OUTCOMES)	ASSESSMENT CRITERIA
<p>3.1 Demonstrate advanced knowledge and highly specialized skills in the selection of appropriate scientific procedures and research methods or techniques in solving complex problems in biotechnology.</p>	<p>3.1.1. Select appropriate research methods and specialized analytical techniques to address specific research problem.</p> <p>3.1.2. Analyze and evaluate different scientific procedures and techniques relevant to the problem being researched.</p> <p>3.1.3. Apply the appropriate research methods or techniques in solving complex and unpredicted problems being investigated.</p>
<p>3.2. Demonstrate the ability to undertake independent research to make significant contribution to scientific knowledge.</p>	<p>3.2.1. Work autonomously in specialized, complex, ill-defined and unpredictable contexts.</p> <p>3.2.2. Independently retrieve and process advanced information relating to the field of study.</p> <p>3.2.3. Publish manuscripts in reputable international-peer reviewed journals with a known impact factor.</p> <p>3.2.4. Present and defend research findings at national, regional, or international scientific meetings</p>
<p>3.3. Demonstrate strategic leadership, high level expertise and professional integrity in specific biotechnology research field.</p>	<p>3.3.1. Tutor undergraduate and Master's learners requiring additional knowledge assistance in the field of study.</p> <p>3.3.2. Mentor and guide undergraduate MSc learners undertaking research projects in the area of study.</p> <p>3.3.3. Adhere to ethical research and academic integrity when conducting research.</p> <p>3.3.4. Guide junior staff, students, or work effectively with others as a member of a team, group, organization, or community.</p> <p>3.3.5. Lead a research team, administer national and international research projects and consult government and private sectors in the field.</p>

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SECTION C	QUALIFICATION STRUCTURE				
COMPONENT	TITLE	Credits Per Relevant NCQF Level			Total Credits
		Level [7]	Level [9]	Level [10]	
FUNDAMENTAL COMPONENT <i>Subjects/ Courses/ Modules/Units</i>					
CORE COMPONENT <i>Subjects/Courses/ Modules/Units</i>	Proposal Development			10	60
	Proposal Seminar Presentation			10	10
	Research and Thesis			10	280
	Thesis Seminar			10	10
	Total				360




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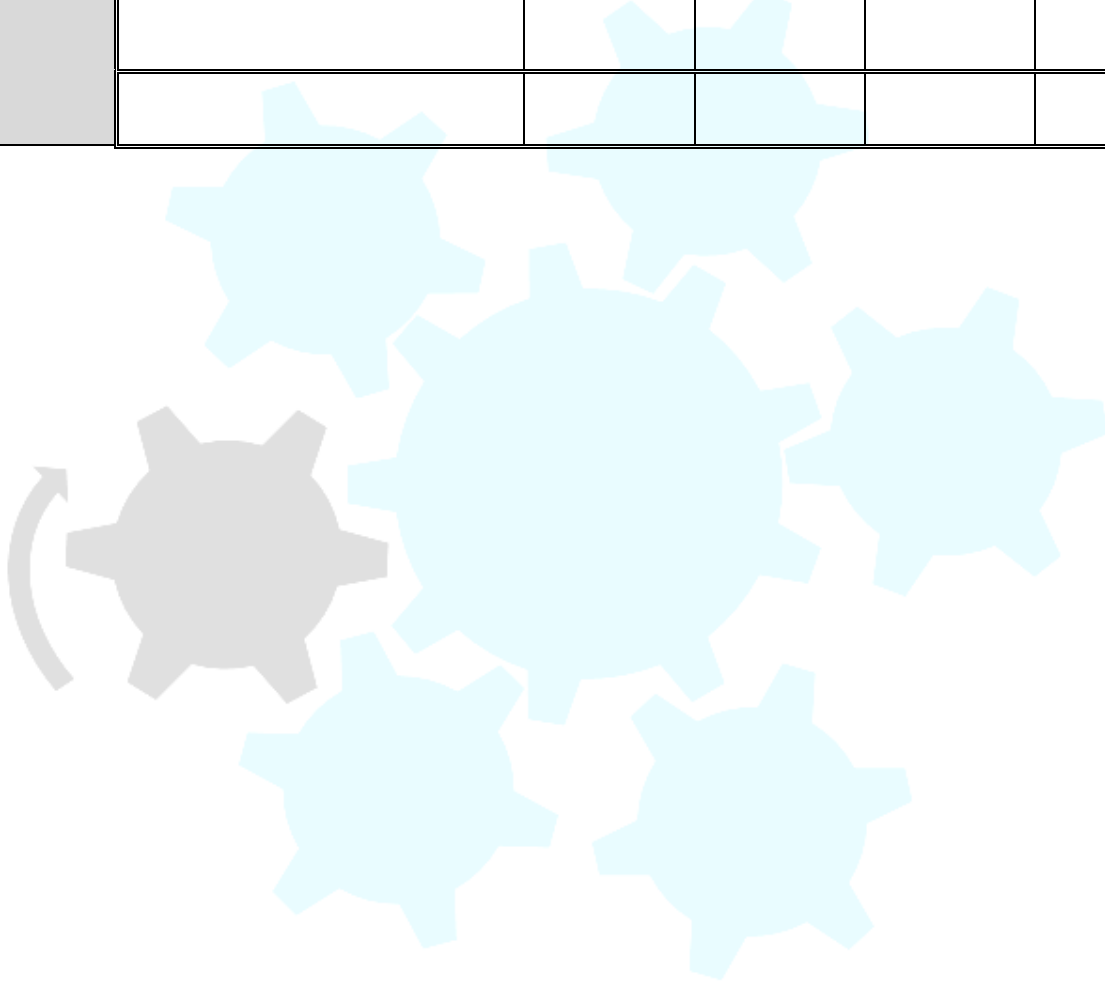
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STRANDS/ SPECIALIZATION	<i>Subjects/ Courses/ Modules/Units</i>	Credits Per Relevant NCQF Level			Total Credits
		Level [7]	Level [9]	Level [10]	
		1.			
2.					
Electives					

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SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	Credit Value
10	360
TOTAL CREDITS	360
Rules of Combination: (Please Indicate combinations for the different constituent components of the qualification)	
The Doctor of Philosophy degree is research-based only and hence does not have different components of qualification.	

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ASSESSMENT ARRANGEMENTS

The qualification is solely researched-based. The student will be assessed based on research accomplishments and original contribution to science at the final output of the research project as presented in the PhD thesis and research publications arising out of it which is summative assessment. Qualified subject specialist will act as internal and external assessors in accordance with applicable policies and regulations.

MODERATION ARRANGEMENTS

Both internal and external moderation will be done by BQA accredited or equivalent subject specialists in the fields. Internal and external moderation shall be done by qualified subject specialists in accordance with applicable policies and regulations.

RECOGNITION OF PRIOR LEARNING

Candidates may submit evidence of prior learning and current competence and/or undergo appropriate forms of recognition of prior learning (RPL) assessment for the award of credits towards the qualification in accordance with institutional Policies in line with the National RPL Policies.

CREDIT ACCUMULATION AND TRANSFER

Candidates can transfer credits accumulated in other qualifications to PhD in Biotechnology program qualification in accordance with the institutional Credit Accumulation and Transfer (CAT) policies which are aligned with BQA/National policies. This will facilitate prior learning to be recognized and transferred to future learning, thus building effective pathways to support learner mobility and progression at the same time minimizing repeated learning.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Learning Pathways

7.1. Vertical articulation (NCQF Level):

PhD in Biotechnology is the highest qualification and there is no possible vertical articulation. Graduates of the programme can, however, access post -doctoral research to expand their knowledge in the area of research.

7.2. Horizontal articulation (NCQF Level):

- Doctorate in Biotechnology

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- Doctorate in Molecular Biotechnology
 - Doctorate in Molecular Biology
 - Doctorate in Bioinformatics
- 7.3. Employment progression pathways:**
- Teaching
 - Research Scientist
 - Laboratory technician
 - Laboratory manager
 - Biosafety Regulator
 - Diagnostician
 - Bioprocess technologist
 - Bioproduct developer


QUALIFICATION AWARD AND CERTIFICATION

Qualification Award
 Minimum standards of achievement for the award of the qualification
 For a Candidate to be awarded this qualification, a minimum of 360 credits must have been acquired as per the total credits indicated for this qualification.

Certification
 A Doctor of Philosophy in Biotechnology will be awarded to a candidate upon successful completion of the qualification in accordance with applicable policies. A certificate and transcript will be issued at award.

SUMMARY OF REGIONAL AND INTERNATIONAL COMPARABILITY

Extensive regional and international comparability was conducted with institutions from various countries from different continents. The universities chosen were University of Pretoria (South Africa), Brock University (Canada) and University of Queensland (Australia). The Universities were chosen because of their best practices in academia and their high rankings in the world scale. There are no universities that offer this qualification nationally. Aspects of the qualification that were compared include the qualification name, the duration of study, the credit load, the qualification structure, and entry requirements. The University of Pretoria offers a programme with streams in biological sciences, including cellular and molecular biology, physiology, ecology, animal biology, plant biology, biomedical sciences, and microbiology. The Brock University PhD Biotechnology program encompasses the broad fields of chemical and gene biotechnology. The programme offered at the University of Queensland focuses on molecular biology, protein technology and bioinformatics. Our programme is research based with no coursework, which is similar to that offered by Brock University. Both University of Pretoria and Queensland offer course work in addition to the research. The qualification we are proposing is at par with the qualifications offered by the universities within the comparative study. Doctor of Philosophy degree in Biotechnology (NQF Level 10, 360 credits) at University of Pretoria, South Africa, accredited by South African Qualifications Authority (SAQA), is taken as a subject

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benchmark for this degree. For details, see the attached comparability matrix document.

REVIEW PERIOD

This qualification will be reviewed after 5 years or as and when the need arises.

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