SECTION A:	QUALIFICATION DETAILS				
QUALIFICATION DEVELOPER (S)	Botswana International University of Science and Technology				
TITLE	Doctor of Philosophy in Statistics			NCQF LEVEL	10
STRANDS (where applicable)	NOT APPLICABLE				
FIELD	Natural, Mathematical and Life Sciences	SUB-FIELD	Mathematics and Statistics	CREDIT VALUE	360
New Qualification	✓	Legacy 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:

1.1.1 Justification for the Qualification

The rationale for the PhD qualification in Statistics is to train and prepare graduates to be exceptional leaders in academia, government, and industry, and thereby enhance and expand the global outreach and influence of the institution and its programmes. The PhD qualification will further develop knowledge and skills that are necessary for the student to conduct independent research and analysis in statistics. The doctoral program involves the

completion of advanced course work and rigorous skills training that prepares students to make original contributions to the knowledge of Statistics and related disciplines.

The program will offer opportunities to produce graduates with the very latest depth of knowledge and capacity to significantly contribute to a knowledge-based economy in Botswana and equip them with the tools for dealing with complex problems in statistics and related disciplines, including ability to produce original research of international standard that address problems that face Botswana, the region, and the rest of the world, and provide leadership and reflective motivation of the nation's citizens.

1.1.2 Needs Assessment Analysis

The need for training in statistics is supported by The Human Resource Development Council (HRDC) report which identified higher degree holders in statistical, mathematical and related associate professionals among those in high demand. The required technical skills were both inferential and applied mathematics skills. In addition, the government of Botswana through NDP11 (2017) mandated universities to produce graduates with Mathematics and Statistics skills. In addition, PhD programs were also identified as those required for research and teaching in higher institutions of learning.

1.1.3 Stakeholders Involvement

Relevant stakeholders have been consulted in the design of the qualification. The department will continue to engage them since they are key industry players who understand the statistical needs of the various institutions. They provide guidance on ensuring that the learning outcomes are aligned to what is required in the field.

PURPOSE: (itemise exit level outcomes)

The purpose of this qualification is to produce graduates with the most advanced knowledge, skills, and competences to:

- Contribute to the development of new knowledge at a most advanced level in the field of statistics through the development of new methods.
- Lead data management and statistical analyses for various research projects/studies.
- Lead statisticians in business or industry.

MINIMUM ENTRY REQUIREMENTS (including access and inclusion)

- Master's Degree (NCQF level 9) in statistics or a cognate field of study

- Applicants who do not meet the above criteria but possess relevant industry experience may be considered through Recognition of Prior Learning (RPL) and Credit Accumulation and Transfer (CAT) institutional policies in line with National RPL and CAT Policies for access.

SECTION B	***QUALIFICATION SPECIFICATION***
GRADUATE PROFILE (LEARNING OUTCOMES)	***ASSESSMENT CRITERIA***
ELO 1 Apply knowledge of the advanced theory of statistics and probability to real-life challenges.	1.1 Use knowledge of advanced theory of statistics and probability to solve problems in different fields including applied statistics and mathematics. 1.2 Generate computer programmes to provide advanced data analysis in situations where existing models are limited. 1.3 Demonstrate understanding of methods used in statistical textbooks and statistical journals and ability to prove statistical theorems.
ELO 2 Produce original research and substantially add to the body of knowledge in the field of statistics.	2.1 Publish manuscripts in reputable statistical journals. 2.2 Presentation of one's own work in departmental seminar and scientific conferences. 2.3 Contributing of book chapters or writing own books. 2.4 The learner's work being cited by other researchers. 2.5 Review statistical journals and provide feedbacks to authors.
ELO 4 Develop the solid knowledge and skills to generate new ideas, discover practical and working solutions that promote further inquiry, and effectively communicate their research.	4.1 Generate new ideas for future research. 4.2 Provide possible topic to undergraduate and postgraduate learners. 4.3 Conduct independent research. 4.4 Publish own work in reputable journals. 4.5 Provide leadership as lead researchers and consultants. 4.6 Provide guidance to technical working groups at institutional and national level.

ELO 5 Apply statistical techniques and theory of statistical inference and probability to solve substantial problems that extend beyond their course work.	5.1 Perform statistical analysis of data for various industries and organization. 5.2 Solve statistical problems by applying knowledge of statistical inference and probability. 5.3 Perform data analysis using appropriate statistical package.
ELO 6 Develop a solid knowledge of the methods of statistical data analysis, including their implementation in statistical packages.	6.1 Conduct independent data analysis for clients. 6.2 Design new statistical computer programs. 6.3 Write computer code or program to suite the data that is being analysed.

SECTION C	***QUALIFICATION STRUCTURE***				
COMPONENT	***TITLE***	***Credits Per Relevant NCQF Level***			***Total Credits***
		Level [8]	***Level [9]***	***Level [10]***	
FUNDAMENTAL COMPONENT *Subjects/ Courses/ Modules/Units*					

CORE COMPONENT *Subjects/Courses/ Modules/Units*	Thesis of Doctor of Philosophy Degree in Statistics			*360*	*360*
STRANDS/ SPECIALIZATION	*Subjects/ Courses/ Modules/Units*	***Credits Per Relevant NCQF Level***			***Total Credits***
		Level [ ]	***Level [ ]***	***Level [ ]***	
1.					

2.					

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	***Credit Value***
Level 10	***360***
TOTAL CREDITS	***360***

Rules of Combination:

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

This qualification will have at least **360 credits** and take at least thirty-six months to complete.

The credit combination for the qualification is from **360 core components** that is based on research.

ASSESSMENT ARRANGEMENTS
All assessments, which are summative, leading to the award of credits in this qualification shall be based on the qualification exit-level outcomes. Summative Assessment - Learners shall undergo a summative assessment which consists of a written thesis and an oral examination at the end of the learning period.
MODERATION ARRANGEMENTS
Since all the assessments for this qualification are through written reports and oral presentations, assessment instruments are moderated only before administering assessments that contribute towards the award of credits in this qualification. Therefore, exit level assessment instruments shall be moderated by an External Moderator to ensure fairness, validity, reliability and consistency of assessments. Qualified external moderators shall be appointed from an accredited Education and Training Providers (ETPs).
RECOGNITION OF PRIOR LEARNING
Recognition of prior learning shall be in line with the Institutional RPL Policy which itself is in line with the National RPL Policy.
CREDIT ACCUMULATION AND TRANSFER
There shall be access and award of credits of the qualification using Institutional Credit Accumulation and Transfer (CAT) Policy in line with the National CAT Policy.
PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)
Learning Pathways **Horizontal progression:** • Doctor of Philosophy degree in related fields such as applied mathematics, data science, econometrics, and epidemiology **Vertical Progression:**

- This is qualification provides a terminal degree hence there will be no vertical articulation beyond NCQF Level 10.

Employment Pathways:

Upon successful completion of the degree, graduates qualify to work as:

- Statistical Consultants
- Data Scientist
- Statistical Analyst
- Business Analyst
- Statistician
- Researcher

QUALIFICATION AWARD AND CERTIFICATION

Qualification award:

The students enrolled in the program will be able to obtain a **Doctor of Philosophy in Statistics**. To obtain the **Doctor of Philosophy in Statistics** the learner must completed at least 360 credits.

Certification:

Candidates meeting prescribed requirements for PhD in statistics will be awarded a **Doctor of Philosophy in Statistics** in accordance with standards prescribed for the award of the qualification and applicable policies.

SUMMARY OF REGIONAL AND INTERNATIONAL COMPARABILITY

The qualification compares favorably with other similar degrees of Doctor of Philosophy in Statistics qualifications, regionally and internationally around the world with regards to:

- Structure and purposes,
- Number of credits,
- Assessment criteria

Structure and purposes

The proposed PhD qualification was compared to other existing PhD regionally (University of Johannesburg and University of Pretoria both in the Republic of South Africa) and internationally (University of Oxford - the United Kingdom and The University of Waikato in New Zealand). All these programs are research based. That is, generally they do not require learners to go through formal coursework. All these programs run for a period of three to four years. In all the PhD qualifications, learners are assigned at least one supervisor who is an established researcher in the area of study to guide them.

In terms of the purpose, the comparable PhD qualifications are designed to provide learners with an in-depth understanding and integrated knowledge of advanced applicable theory in the field of statistics. Also, PhD in Statistics qualification is designed to equip learners with independent thinking skills, novel research skills, transferable skill, which, in generally, are similar to the purpose of the proposed PhD qualification. In all the comparable institutions, learners at PhD level are required to attend and present in departmental seminars.

Number of credits

PhDs in Mathematical Statistics/Statistics of the University of Johannesburg and University of Pretoria, has an NQF credits of 360 and are all at NQF level 10 which is the same as the NCQF number of credits and level for the proposed PhD in Statistics.

The PhD in Statistics qualification of the University of Waikato is also 360 credits and is listed at level 10. However, for the University of Oxford, learners require three years to complete the program which is equivalent to 360 credits.

Assessment Criteria

For all the comparable PhD qualifications, learners are required to write a thesis and produce articles for publication in a reputable scientific journal. Publications in reputable journals are part of the requirements for all these comparable qualifications. Learners are examined by defending a PhD thesis in an oral examination (except in the University of Johannesburg and The University of Waikato).

Observed Differences

There are some differences that exits in relation to assessment criteria. The proposed PhD qualification differs from the ones offered by the University of Johannesburg and The University of Waikato in the sense that for the two, learners do not necessarily defend their PhD thesis.

REVIEW PERIOD
Every five (5) years.