BQA NCQF QUALIFICATION TEMPLATE

SECTION A:	QUALIFICATION DETAILS		
QUALIFICATION DEVELOPER (S)	University of Botswana		
TITLE	Post-Graduate Diploma in Computer Science and Artificial Intelligence	**NCQF LEVEL**	8
STRANDS (where applicable)	N/A		
FIELD	Information and Communications Technology	**CREDIT VALUE**	120
SUB FIELD	Information Technology		

New Qualification	✓	Legacy Qualification		Renewal Qualification	
				Registration Code	

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:

The rapid technological advancements in artificial intelligence (AI) and computing have necessitated broader access to foundational education in these fields. For professionals without formal training in computer science, there is a critical demand for a bridging qualification that enables entry into advanced studies such as Master of Science programs in Computer Science or Data Science and Artificial Intelligence.

Botswana's Vision 2036 and National Development Plan (NDP 11) emphasize building a knowledge-based economy by fostering skills development in emerging technologies. Industry stakeholders and the Human Resource Development Council (HRDC) have reported skill gaps in key areas such as programming, data structures, software development, and AI.

According to the Human Resource Development Council (2023), priority technical skills in Botswana include Data Analytics, AI, Machine Learning, Big Data Engineering, Software Development,

Networking, Algorithms, and Cybersecurity. Feedback from the Department of Computer Science's National Skills Survey (2024) indicates a strong demand for professionals with advanced competencies in data management, algorithmic innovation, and Data-driven and AI-driven solutions. This program will ensure graduates are equipped with these technical capabilities alongside critical soft skills such as leadership, innovation, and ethical responsibility, enabling them to drive transformation in both local and global contexts.

This one-year bridging qualification prepares non-computing graduates, but those who have sufficient mathematical background, to contribute to Computer Science and AI-driven innovation, addressing gaps highlighted in the ACM/IEEE-CS/AAAI Model Curricula (2023) and the Computer Science AI-Skills Survey (2024). Graduates will be equipped to meet industry demands and seamlessly transition into MSc programs in Computer Science or Data Science, and Artificial Intelligence.

Feedback from the HRDC national reports, as well as consultation with international and local advisors, ensures this program aligns with global standards while addressing Botswana's unique development goals.

The Human Resource Development Council (HRDC) national reports on priority skills of 2024 confirm the relevance of this qualification in bridging existing skill gaps. International and local academic advisors have reviewed and endorsed the program's curriculum, ensuring it aligns with global best practices while addressing Botswana's unique socio-economic context. This collaboration ensures the program is robust, forward-looking, and tailored to industry needs.

PURPOSE:

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

1. Apply systematic knowledge of core computing principles, data-driven methods, and AI concepts sufficient for both industry practice.
2. Analyse complex problems, design structured solutions, and apply AI and computing techniques responsibly in solutions guided by ACM/IEEE-CS/AAAI computing standards in the field of computing.
3. Work effectively in multidisciplinary teams and communicate technical concepts in multidisciplinary projects and adapt to evolving technological landscapes.

MINIMUM ENTRY REQUIREMENTS (including access and inclusion)

To be admitted to the Post-Graduate Diploma in Computer Science and Artificial Intelligence, an applicant shall normally have:

(i) NCQF Level 7 (Bachelor's degree) or its equivalent in any non-computing subject.

(ii) Entry through Recognition of Prior Learning (RPL) and Credit Accumulation and Transfer (CAT) is accessible to all candidates through institutional policies in line with the national RPL and CAT policies.

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SECTION B QUALIFICATION SPECIFICATION

GRADUATE PROFILE (LEARNING OUTCOMES)	ASSESSMENT CRITERIA
1. Apply programming, algorithms, and software development skills to design and implement efficient computing solutions in academic, research, and industry settings.	1.1 Develop software applications to address computing problems across academic and industry settings. 1.2 Apply algorithms and data structures to optimise efficiency in problem-solving tasks in industry settings. 1.3 Implement programming solutions that adhere to recognised ACM/IEEE-CS/AAAI computing standards, as they apply in industry settings. 1.4 Document solutions clearly and effectively, including code documentation and user manuals, as required in research and industry settings.
2. Utilise data science methods, AI principles, and machine learning algorithms to address structured problems through benchmarking, validation, and best practices in emerging technology environments.	2.1 Apply basic data science techniques for data cleaning, exploration, visualization, and interpretation as required in industry settings. 2.2 Select and apply appropriate AI principles and machine learning algorithms to problems that arise in research and industry settings. 2.3 Evaluate machine learning model performance using relevant metrics and validation techniques, suitable for problems in research and industry settings. 2.4 Interpret and communicate the outcomes of data-driven and AI-driven processes using approaches suitable for industry projects.
3. Integrate ethical principles and frameworks, such as the ACM Code of Ethics, to guide responsible decision-making and practice in the development and deployment of computing and AI technologies in research and industry.	3.1 Identify ethical challenges in AI and computing applications that arise in industry settings. 3.2 Apply ethical principles to decision-making processes in real-world computing projects, as are found in research and industry. 3.3 Evaluate societal impacts and implications of technology deployment critically in industry settings. 3.4 Demonstrate awareness and application of responsible data usage and privacy practices, which are required in research and industry settings.

4. Analyse computational problems and design structured solutions using methodologies such as Agile and algorithm design principles to solve real-world technical and interdisciplinary challenges in industry settings.	4.1 Analyse computational problems to identify underlying principles and requirements in industry settings. 4.2 Design effective algorithmic and computational solutions using structured methodologies in research and industry settings. 4.3 Critically evaluate alternative solutions, methodologies, and outcomes in industry settings. 4.4 Justify chosen solutions based on sound reasoning, computational efficiency, and practical considerations, in industry settings.
5. Work effectively in multidisciplinary teams and communicating technical concepts clearly, adhering to professional collaboration standards such as Agile, for academic, research, and industry settings.	5.1 Participate effectively in multidisciplinary teamwork, demonstrating collaborative behaviours and adaptability in industry settings. 5.2 Communicate technical concepts clearly and effectively to diverse audiences, both verbally and in writing, suitable for research and industry settings. 5.3 Use appropriate collaborative tools and techniques to facilitate efficient teamwork and information sharing in industry settings. 5.4 Exhibit leadership and initiative in team settings, effectively managing contributions to achieve project goals, as they arise in industry settings.

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SECTION C	QUALIFICATION STRUCTURE		
	TITLE		Total Credits

COMPONENT		Credits Per Relevant NCQF Level			
		Level [7]	Level [8]	Level [9]	
FUNDAMENTAL COMPONENT Subjects/ Courses/ Modules/Units	Mathematics for Artificial Intelligence		16		16
	Programming for Artificial Intelligence		16		16
CORE COMPONENT Subjects/Courses/ Modules/Units	Introduction to Algorithms and Data Structures		16		16
	Artificial Intelligence and Machine Learning		16		16
	Current Topics in Artificial Intelligence		16		16
	Diploma Project in Artificial Intelligence		16		16
STRANDS/ SPECIALIZATION	Subjects/ Courses/ Modules/Units	Credits Per Relevant NCQF Level			**Total Credits**
		Level [ ]	Level [ ]	Level [ ]	
1.					
2.					

Electives **(Learners select 24 out of 48 credits)**	Computer Systems		12		12
	Internet Systems		12		12
	High Performance Computing		12		12
	Natural Language Processing		12		12

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	**Credit Value**
8	**120**
TOTAL CREDITS	**120**

Rules of Combination:

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

This qualification is worth a total of 120 credits, and it comprises the fundamental, core, and elective components as follows:

The qualification requires 32 credits of fundamental courses, 64 credits of core courses, and 24 credits of any two (2) selected elective courses. The total credit a learner must achieve is 120.

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ASSESSMENT ARRANGEMENTS

Assessment will consist of both formative and summative assessments and should be aligned with learning outcomes and sub-outcomes. Assessment will be conducted by registered and accredited assessors by a recognized regulatory body.

1. Formative assessment

The Formative assessment shall contribute 50% of the final grade.

2. Summative assessment

Summative assessment shall contribute 50% of the final grade.

MODERATION ARRANGEMENTS

In accordance with the university policies and regulations, internal and external moderations shall be conducted by BQA registered and accredited moderators or by a recognized regulatory body.

1. Internal moderation requirements

Internal moderation is carried out by registered and accredited moderators whose area of expertise is in with the courses to be moderated.

2. External moderation requirements

External moderation is carried out by accredited moderators from other institutions recruited for this purpose.

RECOGNITION OF PRIOR LEARNING

Candidates may submit evidence of prior learning and current competence and/or undergo appropriate forms of RPL assessment for the award of credits towards the qualification in accordance with applicable university RPL policies and relevant national-level policy and legislative framework. Implementation of RPL shall also be consistent with requirements, if any, prescribed for the field or sub-field of study by relevant national, regional, or international professional bodies.

CREDIT ACCUMULATION AND TRANSFER

There is a provision for award of this qualification through credit accumulation in line with institutional and national CAT policies.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Horizontal Articulation

- Post Graduate Diploma in Statistics.

Vertical Articulation

Graduates of this qualification will have the following options for postgraduate education:

- MSc Data Science and Artificial Intelligence

- MSc Computer Science
- MSc Software Engineering
- MSc Computer Information Systems

QUALIFICATION AWARD AND CERTIFICATION

1. Minimum standards of achievement for the award of the qualification

To be awarded Master of Science (Computer Science) qualification, a learner must meet the minimum requirement for credits from the fundamental, core, and elective courses.

The qualification requires candidates to pass 32 credits of fundamental courses, 64 credits of core courses, and 24 credits of elective courses. The total credits a learner must achieve is 120.

2. Certification

Candidates meeting prescribed requirements will be awarded the qualification Post-Graduate Diploma in Computer Science and Artificial Intelligence in accordance with standards prescribed for the award of the qualification and applicable policies of the university.

SUMMARY OF REGIONAL AND INTERNATIONAL COMPARABILITY

A comparison was made for the proposed Post-Graduate Diploma in Computer Science and Artificial Intelligence both regionally and internationally:

Regionally

It was compared with postgraduate diplomas offered by:

- University of the Witwatersrand (Wits), South Africa (Postgraduate Diploma in Science - Data Science)
- Stellenbosch University (SUN), South Africa (Postgraduate Diploma in Engineering - Data Science)

Similarities

- The qualifications target students from non-computing backgrounds, providing foundational education necessary for advancement into MSc programs.
- The proposed qualification shares similarities in providing mathematical and computational foundational modules.
- All programs reviewed have a one-year full-time duration designed as bridging programs into MSc-level education.

Differences

- The Postgraduate Diploma in Science (Data Science) for Wits University focuses explicitly on Data Science with elective modules in applied domains (e.g., health analytics, education), whereas the proposed qualification has a broader emphasis including Computer Science and AI.
- The Postgraduate Diploma in Engineering qualification offered by Stellenbosch University emphasizes Engineering applications of Data Science and includes specialized modules such as Optimization and Big Data, differing from the broader foundational focus of the proposed qualification.
- The proposed qualification explicitly incorporates AI, machine learning, and ethical considerations, aligning with global best practices in AI curriculum development.

Internationally

It was compared with postgraduate diplomas offered by:

- University of Birmingham Dubai (UAE) (PGDip/MSc in Artificial Intelligence and Computer Science)
- National University of Singapore (Singapore) (Graduate Diploma in Systems Analysis)
- University of Essex Online (UK) (PG Diploma in Data Science)

Similarities

- The qualifications compared internationally share the objective of equipping graduates from non-computing backgrounds with foundational skills for progression to MSc-level programs.
- Courses offered in the international institutions and the proposed qualification cover core foundational topics such as programming, data structures, AI fundamentals, and machine learning.
- Each qualification serves as a bridging program providing clear progression pathways into advanced studies or specialized roles within computing and AI fields.

Differences

- The Postgraduate Diploma in Artificial Intelligence and Computer Science offered at UAE requires an honours degree for entry and provides a direct pathway into an MSc with a project component, while the proposed qualification is specifically a PGDip aimed explicitly at bridging into higher studies without an immediate MSc component.
- The Graduate Diploma in Systems Analysis offered at the National University of Singapore focuses primarily on systems analysis and development, whereas the proposed qualification emphasizes broader computing fundamentals, algorithms, and AI.
- The PG Diploma at the University of Essex Online is longer (16 months, although also 120 credits) and offers fewer foundational topics compared to the proposed qualification's 120-credit comprehensive bridging curriculum.

Education and Employment Pathways

Graduates from the proposed qualification will be well-prepared to transition into MSc-level education in areas such as Computer Science, Data Science and Artificial Intelligence, and Software Engineering, consistent with regional and international comparisons.

Employment opportunities will similarly align with international standards, enabling graduates to enter roles in AI development, data analysis, software development, systems analysis, and related fields.

REVIEW PERIOD
The program will be reviewed every 5 years.

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CODE (ID)			
REGISTRATION STATUS	**BQA DECISION NO.**	**REGISTRATION START DATE**	**REGISTRATION END DATE**
LAST DATE FOR ENROLMENT		**LAST DATE FOR ACHIEVEMENT**	