BQA NCQF QUALIFICATION TEMPLATE

SECTION A:	QUALIFICATION DETAILS		
QUALIFICATION DEVELOPER (S)	**Cyber Intelligence College (CIC) Botswana**		
TITLE	Bachelor of Science in Data Science and Artificial Intelligence	**NCQF LEVEL**	7
STRANDS (where applicable)	N/A		
FIELD	Information and Communication Technology	**CREDIT VALUE**	480
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

This qualification has been developed in direct response to the Human Resource Development Council (HRDC) Priority Skills Report (March 2025), which identifies Big Data Analytics under the area of Data Science as a high-demand skill area. Globally, Data Science and Artificial Intelligence (AI) are transforming industries, with the U.S. Bureau of Labor Statistics (2023) projecting a 36% growth in data science jobs through 2031 and a median annual salary of USD 103,500. These fields are driving

innovation across sectors such as finance, healthcare, agriculture, governance, and security (World Economic Forum, 2023).

In Botswana, the HRDC Priority Skills List 2023/2024 highlights significant shortages in data analytics, AI, cybersecurity, and secure data management, which constrain the country's transition toward a data-driven and digital economy. The Bachelor of Science in Data Science and Artificial Intelligence is designed to bridge these gaps by producing graduates equipped with the competencies required to advance national development priorities.

This qualification aligns with national policy frameworks and strategic aspirations, including:

1. Vision 2036 (Pillars 1 and 2), which emphasize sustainable economic development and human capital excellence.
2. National Development Plan 11 (NDP 11), which promotes the shift toward a knowledge-based economy.
3. The Botswana Digital Services Bill (2025), aimed at ensuring the regulation and trustworthiness of digital platforms.
4. The Botswana Cybersecurity Bill (2025) and the National Cybersecurity Strategy, which emphasize secure data processing and ethical AI adoption; and
5. The EU Digital Services Act, which provides an international benchmark for compliant and transparent digital services.

Guided by insights from the Cyber Intelligence College (CIC) 2025 Data Science and AI Needs Assessment Survey, this program integrates data science, AI, cybersecurity, and blockchain technologies with critical thinking, ethical reasoning, legal literacy, and innovation skills. Graduates will be capable of diagnosing field-specific challenges and implementing innovative, secure, and data-driven solutions across Botswana's key sectors, including finance, e-government, trade, and healthcare.

Ultimately, this qualification supports Botswana's Vision 2036 and the Reset Agenda by fostering a knowledge-based, innovation-driven economy, enhancing national capacity for digital transformation, research, and sustainable development.

PURPOSE:

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

1. Apply data analytics and artificial intelligence techniques to solve real-world problems across diverse sectors including business, healthcare, agriculture, and governance.
2. Design, develop, and evaluate AI models and predictive analytics systems using industry-standard tools and platforms such as Power BI, TensorFlow, and Oracle for automation and data-driven innovation.
3. Implement and manage big data technologies and infrastructures for secure, ethical, and efficient data processing, ensuring compliance with recognized cybersecurity standards and frameworks.
4. Interpret and apply national and international data protection and cybersecurity regulations, including the Botswana Cybersecurity Bill and Digital Services Act, to promote responsible and lawful use of data.
5. Lead and collaborate in interdisciplinary data science and AI projects, demonstrating critical thinking, ethical judgement, and professional responsibility in decision-making and innovation.
6. Communicate and present complex data-driven insights clearly and effectively to technical and non-technical audiences to support strategic, evidence-based decision-making within enterprise and organizational contexts.

MINIMUM ENTRY REQUIREMENTS (including access and inclusion)

1. Applicants must have a minimum of Certificate IV, NCQF Level 4 (TVET/GE) or equivalent
2. Candidates who do not meet the minimum academic qualifications stated above will be considered through the Recognition of Prior Learning (RPL) process which shall be administered according to the National RPL Policy. There will also be provision for Credit Accumulation Transfer to the learner in case they transfer in from another institution as per National Policy on CAT.

SECTION B QUALIFICATION SPECIFICATION

GRADUATE LEARNING OUTCOMES(GLO)	ASSESSMENT CRITERIA(AC)
1. Apply statistical, computational, and AI techniques to collect, analyze, and interpret complex datasets for solving real-world problems across multiple sectors.	1.1 Collect and prepare complex datasets from relevant sources, applying appropriate data cleaning, transformation, and integration techniques to ensure data quality and readiness for analysis. 1.2 Apply suitable statistical, computational, and AI methods (e.g., regression, clustering, neural networks, optimization techniques) to analyze data and extract meaningful patterns, trends, and relationships. 1.3 Interpret analytical results accurately, drawing evidence-based conclusions that clearly address the identified real-world problem and demonstrate awareness of sector-specific contexts and requirements. 1.4 Evaluate the effectiveness of the chosen analytical approach, discussing limitations, ethical considerations, and alternative strategies, and providing justified recommendations for improvement or implementation.
2 Design and develop intelligent systems and predictive models using appropriate programming languages, machine learning frameworks, and data visualization tools such as Python, TensorFlow, and Power BI	2.1 Select and use appropriate programming languages, tools, and frameworks (e.g., Python, TensorFlow, Power BI) to design, train, and deploy predictive models and intelligent systems that meet specified requirements. 2.2 Preprocess and prepare data effectively by applying data cleaning, feature engineering, normalization, and model input structuring techniques to ensure model accuracy and reliability.

	2.3 Build, train, validate, and optimize machine learning models using appropriate algorithms and evaluation metrics, demonstrating the ability to compare model performance and justify model selection. 2.4 Communicate model results through clear visualization and reporting, using tools such as Power BI or matplotlib to present insights, system behavior, and predictive outcomes to both technical and non-technical audiences.
3 Integrate and manage big data technologies to enable scalable data storage, processing, and analysis while ensuring system reliability and performance.	3.1 Select and configure appropriate big data architectures and platforms (e.g., Hadoop, Spark, cloud-based environments) to support scalable data storage, processing, and analytical workloads. 3.2 Implement efficient data ingestion, transformation, and management workflows, demonstrating the ability to handle high-volume, high-velocity, and diverse data sources. 3.3 Monitor and optimise system performance and reliability by applying techniques such as load balancing, fault tolerance, resource allocation, and performance tuning. 3.4 Evaluates the scalability and cost-effectiveness of big data solutions, providing well-reasoned justification for chosen technologies and system configurations in relation to organisational needs
4 Implement cybersecurity measures and ethical data practices to ensure the confidentiality, integrity, and availability of data assets.	4.1. Implement data integrity safeguards, including version control, validation checks, and secure data storage protocols, ensuring that data remains accurate, consistent, and reliable throughout its lifecycle.

	4.2. Demonstrate strategies for ensuring system and data availability, such as backup routines, redundancy planning, and incident response preparedness to minimize downtime and data loss. 4.3. Adhere to ethical data practices and professional standards by ensuring transparency, accountability, privacy protection, and responsible handling of sensitive or personal data in all project and operational tasks.
5. Identify and apply key provisions of the Botswana Cybersecurity Bill, Digital Services Act, and relevant international data protection standards (e.g., GDPR), demonstrating accurate understanding of scope, purpose, and obligations.	5.1. Correctly applies data governance principles (e.g., data classification, access control, data lifecycle management) when analyzing or designing data handling processes or systems. 5.2. Demonstrates ethical and compliant data handling practices by ensuring confidentiality, integrity, and availability of data in practical scenarios such as case studies, projects, or simulated work environments. 5.3. Evaluates organizational data policies and procedures for alignment with national and international regulatory requirements and provides justified recommendations for improving compliance and risk mitigation.
6. Collaborate effectively in interdisciplinary teams, demonstrating leadership, project management, and ethical responsibility in the execution of data science and AI projects.	6.1. Demonstrate effective teamwork and communication by actively contributing to discussions, respecting diverse perspectives, and ensuring clear, timely communication with team members from different disciplinary backgrounds. 6.2. Apply project management principles such as task planning, workload allocation, scheduling, and

	progress monitoring to guide the successful execution of group data science and AI projects. 6.3. Motivate team members, facilitate collaboration, resolve conflicts constructively, and guide the team toward achieving shared project goals. 6.4. Adhere to ethical standards and professional responsibility by ensuring transparency, fairness, data privacy protection, and accountability in project decisions and outcomes.
7. Communicate data-driven insights and technical findings effectively to both specialist and non-specialist audiences, supporting informed and strategic decision-making within professional and enterprise contexts	7.1. Deliver presentations and dashboards (e.g., Power BI, Tableau), assessed for clarity of insights (15%), stakeholder engagement (15%), and strategic impact (10%). 7.2. Select and use appropriate communication formats and tools (e.g., reports, dashboards, presentations, visualizations) tailored to the needs of both technical and non-technical audiences. 7.3. Interpret and translate analytical results into clear, meaningful insights, avoiding unnecessary jargon and ensuring key messages are accurate, concise, and relevant to the audience's level of understanding. 7.4. Justify recommendations and conclusions with evidence, demonstrating the ability to link data insights to strategic, operational, or policy decisions in a professional context. 7.5. Demonstrate effective presentation and engagement skills by organizing content logically, using appropriate visual storytelling techniques, and

	responding confidently and accurately to audience questions or feedback.

SECTION C	QUALIFICATION STRUCTURE				
COMPONENT	TITLE	Credits Per Relevant NCQF Level			Total Credits
		Level [6]	Level [7]	Level [8]	
FUNDAMENTAL COMPONENT Subjects/ Courses/ Modules/Units	Fundamentals of Data Science (CompTIA Data+)	**20**			**20**
	Introduction to AI	**20**			**20**
	Programming for Data Science (Python/R)	**20**			**20**
	DSA104 Discrete Mathematics & Statistics	**20**			**20**
	DSA105 Databases & Data Management (Oracle Cloud Data Management)	**20**			**20**
	DSA106 Professional Ethics & Data Compliance	**20**			**20**

CORE COMPONENT Subjects/Courses/ Modules/Units	DSA201 Data Structures & Algorithms		**20**		**20**
	DSA202 Machine Learning Basics (Google Data Analytics)		**20**		**20**
	DSA203 Big Data Technologies (Hadoop/Spark/Databricks Certified Data Engineer Associate)		**20**		**20**
	DSA204 Data Visualization & Analytics (Power BI/Tableau Desktop Specialist)		**20**		**20**
	DSA205 Risk Management in Data Science		**20**		**20**
	DSA206 Secure Data Processing (GDPR Practitioner)		**20**		**20**
	DSA301 Advanced AI (Deep Learning)		**20**		**20**
	DSA302 Cloud Computing for Data (AWS Certified Data Analytics)		**20**		**20**
	DSA303 Data Mining & Predictive Analytics		**20**		**20**

	DSA304 AI Ethics and Fairness (SAS Certified Data Scientist)		**20**		**20**
	DSA305 Mini Capstone (Data Analytics Project)		**20**		**20**
	DSA401 Advanced Data Science Integration (Microsoft Certified: Azure Data Scientist)		**20**		**20**
	DSA402 Time Series Analysis for AI		**20**		**20**
	DSA403 Strategy & Leadership in Data Science (IBM Data Science Professional)		**20**		**20**
	DSA404 Final Year Project – AI-Data Capstone		**20**		**20**

STRANDS/ SPECIALIZATION	**TITLE**	**Credits Per Relevant NCQF Level**			**Total Credits**
		Level [6]	**Level [7]**	**Level [8]**	

Electives	Natural Language Processing	**30**			**30**
	Computer Vision	**30**			**30**
	AI in Healthcare		**30**		**30**
	AI for Finance		**30**		**30**
	Ethical AI Governance		**30**		**30**
	Big Data Security		**30**		**30**

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	**Credit Value**
6	150
7	330
TOTAL CREDITS	**480**

Rules of Combination:

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

The qualification requires:

- Fundamental: All 120 credits mandatory (Level 6).
- Core: All 300 credits mandatory at Level 7

- Electives: Choose one 30-credit elective at (Level 6) and one in (Level 7), totalling 60 credits.
- Total: 480 credits, with RPL exemptions up to 120 credits.

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%

2. **Summative assessment**

   Summative assessment shall contribute 50% regulations.

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

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

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

- BSc Computer Science (UB, BIUST, University of Johannesburg)
- BscData Science (UCT

Vertical Articulation

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

- MSc Data Science/AI (Maryland, Warwick, UCT, Edinburgh)
- PhD Data Science/AI (Stanford, Carnegie Mellon, Oxford, MIT)

Employment Pathways

Graduates of this qualification will be able to take up the following jobs

- Data Scientist
- AI Analyst
- Machine Learning Engineer
- Data Compliance Officer
- Predictive Analytics Specialist
- Business Intelligence Analyst (HRDC-aligned, 36% growth, BLS 2023).

QUALIFICATION AWARD AND CERTIFICATION

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

   To be awarded a Bachelor of Science in Data Science and Artificial Intelligence qualification, a candidate must complete a minimum of 480 credits as prescribed for the qualification.

   Certification

2. A certificate will be issued to learners who are awarded the qualification.

SUMMARY OF REGIONAL AND INTERNATIONAL COMPARABILITY

The proposed Bachelor of Science in Data Science and Artificial Intelligence at CIC Botswana is a 4-year, 480-credit qualification (NCQF Level 7) designed to equip learners with advanced skills in AI-enhanced Data Science. There are no similar qualifications with tittle regional, but internationally the following qualifications benchmarked against with some similar modules:

1. Stellenbosch University South Africa Bachelor of Data Science (BDatSci) NQF Level 7 360 credits
2. Bangor University (UK) BSc Data Science & Artificial Intelligence (Hons) Level 6 of the Regulated Qualifications Framework (RQF),.360 UK credits, 3 years
3. Princess Sumaya University for Technology (Jordan) BSc in Data Science & Artificial Intelligence
4. Green University of Bangladesh BSc in Artificial Intelligence & Data Science

1. Title of Qualification, NQF Level & Duration

Similarities

All four are undergraduate bachelor's degrees focused on Data Science and/or Artificial Intelligence. All qualifications run for 3–4 years, depending on the country.

Differences

Titles vary slightly: BDatSci (specialised branding – Stellenbosch) BSc Data Science & AI (Bangor) BSc AI & Data Science (Green University).

Duration differences:

3 years: Bangor, Stellenbosch, 4 years: PSUT and Green University.

2. Main Exit Outcomes

Similarities

All graduates are expected to: Demonstrate strong computational, mathematical, and statistical knowledge. Apply machine learning, data analytics, and AI tools to real-world problems. Handle large datasets, perform data preparation, and conduct predictive modelling. Demonstrate ability in problem-solving, research skills, and ethical data handling.

Differences

Stellenbosch: Stronger focus on mathematical and statistical foundations due to integration with applied domains (e.g., health, business, biological sciences). Bangor: Emphasis on AI algorithms,

robotics, and applied computing. Strong industry alignment—focus on AI systems deployment, data-driven decision-making, and software engineering. Green University: Broader emphasis on AI engineering, software development, and applied analytics in emerging markets.

3. Domains / Modules / Subjects

Similarities

All four include core study areas: Programming (Python, Java, R) Calculus, Linear Algebra, Probability & Statistics

Machine Learning & Deep Learning Databases & Data Management AI Algorithms Data Visualization Research Project / Capstone

Differences

Stellenbosch: Offers domain-focused streams (e.g., biological, business, health applications). Bangor: Includes robotics, cognitive modelling, and industry skills modules. PSUT: Heavier inclusion of software engineering, cloud computing, and IoT. Green University: Introduces AI ethics, big data engineering, and neural networks earlier in the programme.

4. Assessment Strategies & Weightings

Similarities

All use a mix of: Written exams Coursework Practical labs / coding assignments Projects and case studies Final-year research project Continuous assessment is common (typically 40–60%).

Differences

Stellenbosch: Higher emphasis on quantitative assessments and domain-specific application tasks. Bangor: Strong project-based learning, including team software projects. PSUT: Industry-facing assessments using real AI systems and professional lab-based assessments. Green University: Blended assessments with theory-heavy exams given national requirements.

5. Qualification Rules & Minimum Awards Standards

Similarities

All require: Passing all compulsory modules. Completion of a capstone project. Meeting minimum GPA/average score thresholds. Proof of competency in programming and data analytics.

Differences

Stellenbosch: Requires domain specialisation completion and strong mathematical pass marks. Bangor: UK standardised honours structure with classification levels (1st, 2:1, 2:2). PSUT: Requires minimum GPA and credit completion tied to national accreditation requirements. Green University: Follows Bangladesh's national HE structures (mandatory attendance + final exam weighting).

Conclusion

The developed Bachelor of Science in Data Science and Artificial Intelligence aligns and compares positively with the benchmarked qualifications. It equips graduates with the ability to apply machine learning, data analytics, and AI tools to real-world challenges; manage and analyse large datasets; perform data preparation and predictive modelling; and demonstrate strong problem-solving, research, and ethical data-handling competencies.

REVIEW PERIOD

The qualification will be reviewed every 5 years.

For Official Use Only:

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