

BQA NCQF QUALIFICATION TEMPLATE

SECTION A: QUALIFICATION DETAILS											
QUALIFICATION DEVELOPER (S)			Botswana Accountancy College								
TITLE		Bachelor of Science in Artificial Intelligence and Internet of Things					NCQF LEVEL		7		
STRANDS (where applicable)		1. Robotics 2. Virtual and Augmented Reality 3. Blockchain 4. Natural Language Processing									
FIELD		Information and Communication Technology					CREDIT VALUE		480		
SUB FIELD		Information Technology									
New Qualification		P	Legacy Qualification			Renewal Qualification					
						Registration Code					
SUB-FRAMEWORK		General Education			TVET		Higher Education			P	
QUALIFICATION TYPE		Certificate	I	II	III	IV	V	Diploma	Bachelor		P
		Bachelor Honours			Post Graduate Certificate			Post Graduate Diploma			
		Masters				Doctorate/ PhD					
RATIONALE AND PURPOSE OF THE QUALIFICATION											
<p>RATIONALE:</p> <p>This qualification has been developed in response to a nationally recognized shortage of professionals in the fields of Artificial Intelligence (AI) and the Internet of Things (IoT). According to the Human Resource Development Council (HRDC, 2023), occupations such as Data Scientist, Robotics Engineer, Blockchain Developer, and Augmented/Virtual Reality Developer are listed as priority skills urgently required to support Botswana’s transition to a digital economy. The HRDC further emphasizes</p>											

the need to address the growing demand for professionals equipped with competencies in AI, robotics, blockchain, and immersive technologies (HRDC, 2023 Priority Skills List).

This Bachelor of Science in Artificial Intelligence and Internet of Things has been carefully designed to bridge these gaps by producing a pipeline of graduates with practical and theoretical expertise in both Artificial Intelligence (AI) and IoT (Internet of Things) technologies. The qualification includes specialized elective strands in Blockchain, Robotics, Natural Language Processing (NLP), and Augmented/Virtual Reality (AR/VR), offering targeted responses to sector-specific skills shortages identified in national studies.

The qualification is directly aligned with Botswana's long-term national development agenda. Vision 2036 outlines the ambition to transform Botswana into a high-income, knowledge-based economy by 2036. It emphasizes the critical importance of developing high-end skills in science, technology, engineering, and mathematics (STEM), particularly in emerging fields like artificial intelligence and advanced automation (Republic of Botswana, 2016).

Complementing this, the Reset and Reclaim Agenda (Republic of Botswana, 2021) prioritizes digital transformation and calls for a technologically skilled workforce capable of driving innovation, economic diversification, and enhanced public service delivery. The agenda highlights the Fourth Industrial Revolution as a catalyst for reimagining productivity, with AI and IoT playing central roles. This qualification thus becomes a key enabler of national goals by preparing graduates to lead digital innovation across sectors such as agriculture, mining, healthcare, logistics, and education.

International trends strongly support the need for such a qualification. The World Economic Forum (2023) identifies analytical thinking, AI, and big data among the top five in-demand job skills globally. Furthermore, global consulting firm PwC (2020) projects that AI will contribute up to USD 15.7 trillion to the global economy by 2030. The International Data Corporation (IDC, 2022) forecasts that IoT-related global spending will surpass USD 1.3 trillion by 2026, with over 41.6 billion connected IoT devices expected to be in use worldwide.

Regionally, countries in the Southern African Development Community (SADC) are increasingly adopting AI and IoT to address socio-economic challenges in agriculture, urbanization, health, and governance. However, a limited number of institutions offer qualifications that combine both AI and IoT with relevant sector applications. This qualification aims to position Botswana as a regional leader in AI and IoT education by offering a comprehensive and future-oriented curriculum.

A key distinguishing feature of this qualification is the inclusion of four focused elective strands. Each of these has been introduced to directly address sectoral needs identified through HRDC's priority skills reports and emerging trends in Botswana's economy.

- Blockchain

Blockchain technologies are gaining traction in Botswana, particularly in finance, land administration, and diamond certification. HRDC (2023) identifies Blockchain Developers as a scarce skill in high demand. This strand equips learners with expertise in cryptography, smart contracts, and decentralized application development, aligning with emerging needs in financial inclusion, traceability, and secure digital governance.

- Robotics

The increasing integration of automation in mining, agriculture, and manufacturing in Botswana underscores the need for Robotics Engineers with AI and IoT expertise. HRDC (2023) recognizes robotics as a critical skill gap, and this strand develops competencies in mechatronics, control systems, and autonomous systems that support industrial automation and productivity gains.

- Natural Language Processing (NLP)

With the rise of intelligent customer service and smart government solutions, Botswana needs AI systems that can process local languages for inclusive service delivery. This strand addresses that need by training students to build conversational agents, speech recognition tools, and text-processing systems capable of understanding Setswana and English. It promotes local language preservation while contributing to digital inclusion.

- Augmented and Virtual Reality (AR/VR)

AR/VR technologies have promising applications in Botswana's education, tourism, and mining sectors. HRDC's priority skills list includes Virtual/Mixed Reality Developers, citing the need for content creators and simulation experts. This strand develops learners in 3D modeling, immersive interface design, and virtual training system development for sectors such as mining safety, remote healthcare, and cultural tourism.

This qualification is a nationally relevant and globally aligned response to Botswana's strategic human resource needs. It directly supports the development of a future-ready workforce and provides a solid foundation for Botswana's transition into a knowledge-based, technology-driven economy. The integration of AI and IoT into one cohesive qualification—with sector-specific specialization—ensures that graduates are not only capable of addressing today's challenges but are also equipped to lead innovation in the decades to come. This is not just an academic qualification but a transformational tool to drive Botswana's digital agenda.

References:

- Human Resource Development Council. (2023). Priority Skills List 2023/24. Gaborone: HRDC.
- Republic of Botswana. (2016). Vision 2036: Achieving Prosperity for All. Gaborone: Government Printer.
- Republic of Botswana. (2021). Reset and Reclaim Agenda. Gaborone: Government Press.
- World Economic Forum. (2023). The Future of Jobs Report 2023. Geneva: WEF.
- PwC. (2020). AI to Drive Global GDP Gains. Retrieved from www.pwc.com
- International Data Corporation (IDC). (2022). Worldwide IoT Spending Guide. Framingham, MA: IDC.

PURPOSE: (itemise exit level outcomes)

The purpose of this qualification is to produce graduates with specialised knowledge, skills and competence to:

1. Design and develop intelligent systems by integrating Artificial Intelligence (AI) and Internet of Things (IoT) technologies to address real-world challenges in sectors such as healthcare, agriculture, manufacturing, logistics, and smart infrastructure.
2. Analyze complex, real-time, and data-intensive problems and implement innovative AI- and IoT-driven solutions that optimize performance, enable automation, and enhance decision-making across digital systems.
3. Apply advanced concepts in machine learning, data analytics, cloud computing, and cybersecurity to support the secure development and deployment of intelligent, connected systems within modern enterprises.

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4. Communicate technical and non-technical information effectively, manage projects, and collaborate across multidisciplinary teams to lead the implementation of AI/IoT systems in cross-functional environments.
5. Evaluate and apply ethical, legal, and regulatory frameworks in the design and deployment of intelligent technologies, promoting responsible innovation, data privacy, inclusivity, and sustainable digital transformation.
6. Demonstrate adaptability and leadership in emerging trends across AI, IoT, and converging technologies, incorporating domain-specific innovations such as robotics, blockchain, natural language processing, and extended reality to build scalable, next-generation intelligent solutions.

MINIMUM ENTRY REQUIREMENTS (including access and inclusion)

- (a) Certificate IV, NCQF Level 4 entry or equivalent
- (b) Recognition of Prior Learning and CAT will be done in line with individual ETP policies.

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SECTION B QUALIFICATION SPECIFICATION	
GRADUATE PROFILE (LEARNING OUTCOMES)	ASSESSMENT CRITERIA
<p>1. Create intelligent systems and devices using Artificial Intelligence (AI) and IoT (Internet of Things) technologies for industrial revolution across key sectors in Botswana and beyond.</p>	<p>1.1 Design an intelligent system or device aligned with the requirements of a given project proposal.</p> <p>1.2 Implement the designed system using appropriate programming languages and frameworks, justifying all choices.</p> <p>1.3 Compile a clear and organized report documenting the design, development, and testing processes.</p> <p>1.4 Present the final product professionally, highlighting system features, applications, and performance metrics.</p>
<p>2. Analyse complex problems related to Artificial Intelligence (AI) and IoT (Internet of Things) and develop innovative solutions to address them for businesses, government agencies, and other organizations.</p>	<p>2.1 Propose innovative and practical solutions to address identified problems.</p> <p>2.2 Apply analytical tools and decomposition techniques to break down problems.</p> <p>2.3 Justify the chosen solution strategy, referencing alternative approaches.</p>

	<p>2.4 Deliver a clear explanation of the solution and its potential impact on relevant stakeholders.</p>
<p>3. Apply programming languages such as machine learning, data analytics, cloud computing, and cybersecurity concepts to design and develop intelligent systems and devices for enterprises requiring technology-driven innovation.</p>	<p>3.1 Apply suitable programming languages relevant to Artificial Intelligence, Internet of Things, Machine Learning, and data analytics. 3.2 Implement machine learning, data analytics, and cloud computing to build intelligent systems. 3.3 Incorporate cybersecurity measures to secure AI and IoT applications. 3.4 Justify the selection of tools and technologies during system development. 3.5 Prepare technical documentation that outlines system architecture and components. 3.6 Conduct system performance testing and provide optimization strategies.</p>
<p>4. Demonstrate proficiency in project management, including the ability to plan, execute, and monitor projects related to Artificial Intelligence (AI) and IoT (Internet of Things) for cross-functional teams and multi-stakeholder environments.</p>	<p>4.1 Develop a project plan that includes goals, timelines, risks, and resources. 4.2 Execute project tasks in line with the project schedule and scope. 4.3 Monitor project performance using project management tools and adjust as needed. 4.4 Coordinate and lead cross-functional teams for project success. 4.5 Conduct post-project reviews to identify lessons learned. 4.6 Present project outputs to relevant stakeholders in an organized manner.</p>
<p>5. Work effectively in a team, collaborating with engineers, data scientists, and other professionals to achieve common goals related to Artificial Intelligence (AI) and IoT (Internet of Things) applications for various industries.</p>	<p>5.1 Contribute actively to team objectives and task completion. 5.2 Engage in collaborative decision-making and idea sharing. 5.3 Maintain clear communication with team members to promote coordination. 5.4 Communicate project updates and findings to relevant stakeholders. 5.5 Resolve team conflicts constructively to maintain team cohesion. 5.6 Reflect on team dynamics to improve collaboration. 5.7 Present final team deliverables in a unified, coherent format.</p>

<p>6. Communicate specialized technical concepts and solutions effectively to non-technical stakeholders, including business executives, clients, and policymakers, using appropriate formats and language suited to diverse audiences</p>	<p>6.1 Use appropriate communication tools (e.g., presentations, reports, visual aids) to effectively convey information.</p> <p>6.2 Tailor communication style and content to suit the needs and understanding of various audiences (e.g., executives, clients, or policymakers).</p> <p>6.3 Engage with stakeholders through active listening and provides clear, concise responses to their questions and concerns.</p> <p>6.4 Present technical reports and findings in a professional manner, ensuring clarity, structure, and coherence.</p> <p>6.5 Reflect on communication effectiveness, identifying areas for improvement in conveying technical information to non-technical audiences.</p>
<p>7. Apply ethical, legal, and social frameworks to the design and development of responsible Artificial Intelligence (AI) and IoT (Internet of Things) systems, ensuring compliance, inclusivity, and societal impact for end-users, clients, and communities.</p>	<p>7.2 Apply legal and ethical frameworks in system design.</p> <p>7.3 Assess risk and impact of technologies on various user groups.</p> <p>7.4 Recommend privacy and bias mitigation strategies in design.</p> <p>7.5 Justify development decisions with regulatory and ethical rationale.</p> <p>7.6 Propose measures for equitable and responsible system deployment.</p>
<p>8. Identify and analyze trends and emerging technologies related to Artificial Intelligence (AI) and IoT (Internet of Things), adapting to changes in the field</p>	<p>8.1 Analyse implications of new technologies in business and industry.</p> <p>8.2 Recommend ways to incorporate emerging trends into existing systems.</p> <p>8.3 Propose future-facing solutions for digital innovation.</p> <p>8.4 Stay informed through continuous learning and technology tracking.</p> <p>8.5 Assess organizational readiness for adopting new technologies.</p>
<p>9. Design and develop robotic systems that integrate Artificial Intelligence (AI) and IoT (Internet of Things) technologies for automation and intelligent operations.</p>	<p>9.1 Analyse automation requirements and translate them into specific, measurable design objectives.</p> <p>9.2 Develop a system architecture that integrates AI components, IoT sensors, and control mechanisms.</p>

	<p>9.3 Select hardware components and connectivity solutions based on system requirements and justify their selection.</p> <p>9.4 Implement and test the robotic system to validate real-time operational functionality and automation reliability.</p> <p>9.5 Produce clear documentation of the system's design and integration process, highlighting design decisions and architecture.</p> <p>9.6 Evaluate and present the robotic system's performance against predefined criteria for automation and intelligent behavior.</p>
<p>10 Program and deploy robots capable of sensing, learning, and responding to their environment using AI (Artificial Intelligence) algorithms.</p>	<p>10.1 Apply Artificial Intelligence(AI) algorithms that enable sensing, learning, and environmental response capabilities in robotic systems.</p> <p>10.2 Configure and calibrate sensors to allow accurate environmental perception and data interpretation.</p> <p>10.3 Develop and train learning models that improve the robot's behavior based on environmental interaction data.</p> <p>10.4 Integrate AI algorithms for real-time decision-making and dynamic responses in varied environments.</p> <p>10.5 Deploy and test the robot's autonomy in a controlled environment to assess its learning and response functions.</p> <p>10.6 Debug and optimize robot performance by identifying issues and implementing code or system refinements.</p> <p>10.7 Compile a deployment report documenting the process, challenges, and improvements achieved.</p>
<p>11. Apply human-robot interaction (HRI) principles to create intuitive, user-friendly systems that work alongside humans in industrial and service environments.</p>	<p>11.1 Design control mechanisms and user interfaces that support intuitive operation by diverse users.</p> <p>11.2 Implement HRI features that ensure safety and responsiveness during human interaction.</p> <p>11.3 Incorporate real-time feedback systems that enable robots to adjust behaviour based on user input.</p>

	<p>11.4 Conduct usability testing with target users to evaluate the system’s intuitiveness and safety.</p> <p>11.5 Enhance robot communication and control mechanisms based on test results and interaction metrics.</p> <p>11.6 Document and present the HRI implementation process, including user feedback analysis and refinement outcomes.</p>
<p>12. Develop secure and decentralized applications using blockchain technology integrated with IoT systems to enhance data security and integrity.</p>	<p>12.1 Analyse the integration of blockchain and IoT for creating secure, decentralized applications.</p> <p>12.2 Virtualize data security and integrity challenges in IoT systems that can be mitigated using blockchain.</p> <p>12.3 Design blockchain-based architectures for secure communication and decentralized data storage in IoT systems.</p> <p>12.4 Implement smart contracts to automate data validation and enhance the security of IoT systems.</p> <p>12.5 Integrate IoT devices with blockchain networks for real-time data recording and interaction.</p> <p>12.6 Test the developed system’s security, focusing on data integrity, fault tolerance, and transaction transparency.</p> <p>12.7 Document and present the system, emphasizing improvements in security and reliability achieved through blockchain integration.</p>
<p>13. Apply blockchain protocols to manage IoT networks, ensuring secure transactions, privacy, and transparency across connected devices.</p>	<p>13.1 Assess the functionality of blockchain protocols and their application in managing IoT networks.</p> <p>13.2 Respond to challenges in IoT network security, privacy, and transparency that blockchain can address.</p> <p>13.3 Implement blockchain protocols to secure communications among IoT devices.</p> <p>13.4 Configure privacy mechanisms such as encryption and anonymization within blockchain-enabled IoT networks.</p> <p>13.5 Apply immutable ledger features to ensure real-time transaction transparency and traceability.</p>

	<p>13.6 Evaluate improvements in IoT network security, privacy, and performance due to blockchain implementation.</p> <p>13.7 Document and present the application of blockchain protocols, detailing how they resolved specific IoT network challenges.</p>
<p>14. Evaluate industry-specific blockchain use cases, particularly in finance, supply chain management, and healthcare, leveraging AI for predictive analytics and decision-making.</p>	<p>14.1 Apply blockchain technologies in industries such as finance, supply chain management, and healthcare.</p> <p>14.2 Analyse challenges and opportunities in implementing blockchain in these sectors.</p> <p>14.3 Evaluate how blockchain solutions address specific industry issues like fraud, inefficiency, or data breaches.</p> <p>14.4 Apply AI-driven predictive analytics to assess the effectiveness of blockchain solutions in real-world scenarios.</p> <p>14.5 Compare blockchain implementations across industries to identify patterns and transferable strategies.</p> <p>14.6 Assess economic, operational, and ethical considerations of blockchain use in various industries.</p> <p>14.7 Present industry-specific recommendations based on data-driven evaluations of blockchain technologies and AI integration.</p>
<p>15. Develop Natural Language Processing (NLP)-based systems that utilize AI to process, understand, and generate human language for applications such as virtual assistants, chatbots, and automated customer service.</p>	<p>15.1 Choose Natural Language Processing (NLP) concepts and techniques that can be used for language processing and generation.</p> <p>15.2 Specify application goals and user requirements for systems such as virtual assistants or chatbots.</p> <p>15.3 Design and implement AI-based NLP systems that process, understand, and generate human language.</p> <p>15.4 Apply suitable NLP models (e.g., sequence-to-sequence, transformer models) for understanding and generating language.</p> <p>15.5 Test and assess system performance in terms of accuracy, fluency, and user satisfaction.</p> <p>15.6 Incorporate user feedback to improve system responsiveness and relevance.</p>

	<p>15.7 Document and present the system development process, highlighting design decisions and areas for future improvement.</p>
<p>16. Implement deep learning techniques in NLP, including sentiment analysis, machine translation, and text classification.</p>	<p>16.1 Analyse the application deep learning models relevant to NLP tasks, including Recurrent Neural Networks (RNNs), Long Short-Term Memory (LSTMs), Gated Recurrent Unit (GRUs), and transformers.</p> <p>16.2 Perform sentiment analysis, machine translation, or text classification using advanced deep learning techniques.</p> <p>16.3 Prepare and preprocess text data for deep learning models, including tokenization and embedding.</p> <p>16.4 Train and fine-tune deep learning models to optimize performance for NLP tasks.</p> <p>16.5 Evaluate models using standard metrics such as accuracy, Bilingual Evaluation Understudy (BLEU) scores, or F1 scores.</p> <p>16.6 Identify and address limitations or biases in model outputs.</p> <p>16.7 Document and present implementation results, highlighting model choices and performance outcomes.</p>
<p>17. Apply information retrieval and extraction techniques to develop AI systems capable of understanding large datasets and extracting meaningful insights from unstructured text.</p>	<p>17.1 Describe information retrieval and extraction techniques such as keyword matching, Named Entity Recognition (NER), and topic modelling.</p> <p>17.2 Develop algorithms to analyse unstructured text from datasets like documents or social media.</p> <p>17.3 Create AI systems that extract meaningful insights using retrieval and extraction techniques.</p> <p>17.4 Incorporate scalable processing frameworks such as Term Frequency-Inverse Document Frequency(TF-IDF), Bidirectional Encoder Representations from Transformers (BERT), or NLP pipelines.</p> <p>17.5 Test and validate AI system performance based on accuracy and relevance of extracted insights.</p>

	<p>17.6 Analyse and mitigate errors or biases in the information extraction process.</p> <p>17.7 Present the system’s design and insights, highlighting its effectiveness in handling large-scale unstructured data.</p>
<p>18. Design and develop Virtual and Augmented Reality (VR/AR) applications that integrate AI and IoT technologies to create immersive, interactive environments.</p>	<p>18.1 Explain Virtual and Augmented reality (VR/AR) design principles and how AI and IoT integration enhances immersive experiences.</p> <p>18.2 Define the functional and user engagement requirements for interactive VR/AR environments.</p> <p>18.3 Design and develop VR/AR applications that incorporate AI features and real-time IoT data.</p> <p>18.4 Integrate sensors and IoT devices to create responsive and dynamic virtual environments.</p> <p>18.5 Test and assess application performance for immersion, interactivity, and responsiveness.</p> <p>18.6 Compile and present documentation detailing development challenges, design solutions, and innovations.</p> <p>18.7 Refine application usability and accessibility through iterative user testing and feedback analysis.</p>
<p>19. Apply machine learning and computer vision techniques to enhance Virtual and Augmented reality(VR/AR) experiences, such as object recognition, gesture control, and real-time environment mapping.</p>	<p>19.1 Explain machine learning and computer vision techniques used in VR/AR systems.</p> <p>19.2 Implement ML models for object detection, gesture tracking, or motion prediction within VR/AR environments.</p> <p>19.3 Develop systems for real-time mapping and interactive feedback using computer vision algorithms.</p> <p>19.4 Incorporate AI models into VR/AR apps for real-time interaction and analytics.</p> <p>19.5 Evaluate system accuracy and responsiveness through user testing and technical benchmarks.</p> <p>19.6 Identify and mitigate potential model limitations or biases affecting user interaction.</p> <p>19.7 Document AI-enhanced features and analyze their influence on the overall VR/AR user experience.</p>

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<p>20. Evaluate industry-specific Virtual and Augmented Reality (VR/AR) applications, such as in healthcare, education, and training, and create AI-powered solutions that augment real-world scenarios.</p>	<p>20.1 Describe VR/AR applications tailored for specific industries like healthcare, education, or training.</p> <p>20.2 Evaluate how effectively current VR/AR technologies address sector-specific challenges.</p> <p>20.3 Propose AI-augmented solutions to improve existing VR/AR applications in real-world use cases.</p> <p>20.4 Develop and showcase concepts or prototypes that incorporate AI to solve industry problems.</p> <p>20.5 Assess ethical and technical considerations related to deploying VR/AR in sensitive environments.</p> <p>20.6 Summarize key findings and offer implementation recommendations based on stakeholder needs.</p> <p>20.7 Justify how AI integration enhances scalability, efficiency, or usability of VR/AR systems in industry settings.</p>
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SECTION C	QUALIFICATION STRUCTURE				
COMPONENT	TITLE	Credits Per Relevant NCQF Level			Total Credits
		Level [5]	Level [6]	Level [7]	
FUNDAMENTAL COMPONENT Subjects/ Courses/ Modules/Units	Introduction to Python Programming	15			15
	Computer Networks		15		15
	Data Analytics		15		15
	Computational Mathematics 1	15			15

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	Computer Systems Installation and Maintenance	15			15
	Computational Mathematics 2	15			15
	Entrepreneurship and Innovation			5	5
	Database Design and Development		15		15
CORE COMPONENT Subjects/Courses/ Modules/Units	Machine Learning		15		15
	Introduction to IoT	15			15
	Cloud Computing		15		15
	Introduction to Artificial Intelligence	15			15
	Natural Language Processing		15		15
	IoT Security and Privacy		15		15
	Computer Vision		15		15
	IoT Services and Applications		15		15
	Programming IoT Embedded Systems		15		15
	Intelligent Systems			15	15
	Smart Agriculture and IoT			15	15
	Smart Cities and IoT			15	15
	Deep Learning Applications			15	15
	IoT Industry Applications			15	15

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	Emerging Trends in AI and IoT			15	15
	Ethics and Governance in AI and IoT			15	15
	Signal Analytics and Interpretation			15	15
	Industry Attachment			60	60
	Human Computer Interaction			10	10
STRANDS/ SPECIALIZATION	Subjects/ Courses/ Modules/Units	Credits Per Relevant NCQF Level			Total Credits
		Level [5]	Level [6]	Level [7]	
1. Robotics	Robotic Design and Development		15		15
	Human-Robot Interaction			15	15
	Artificial Intelligence for Robotics			15	15
2. Blockchain	Blockchain fundamentals		15		15
	Blockchain Security and Privacy			15	15
	Blockchain Application and Industry Cases			15	15

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3. Natural Language Processing	Deep Learning for NLP		15		15
	Natural Language Applications			15	15
	Information Retrieval and Extraction			15	15
4. Virtual and Augmented Reality	Virtual and Augmented Reality Fundamentals		15		15
	Virtual and Augmented Reality Development			15	15
	Virtual an Augmented Reality Application			15	15
Electives					

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SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL

TOTAL CREDITS PER NCQF LEVEL

NCQF Level	Credit Value
5	90
6	165
7	225
TOTAL CREDITS	480

Rules of Combination:

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

Fundamentals	Level 5	60 Credits
Fundamentals	Level 6	45 Credits
Fundamentals	Level 7	5 Credits
Core	Level 5	30 Credits
Core	Level 6	105 Credits
Core	Level 7	190 Credits
Strands	Level 6	15 Credits
Strands	Level 7	30 Credits
Total Credits		480 Credits

Learners choose 1 strand worth 45 credits and there are no electives for this qualification.

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ASSESSMENT ARRANGEMENTS

Assessment shall consist of the following:

- Formation assessment (60%)
- Summative assessment (40%)

MODERATION ARRANGEMENTS

There is provision for internal and external moderation on all assessments. And the personnel must be registered with BQA as an Assessor with a master's degree in the same or related field.

RECOGNITION OF PRIOR LEARNING

There is provision to award credits through Recognition of Prior Learning.

CREDIT ACCUMULATION AND TRANSFER

There is provision for award of credits through CAT in line with the ETP policies.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

LEARNING PATHWAYS

Vertical Pathways

- Bachelor of Science with Honours in Artificial Intelligence and Robotics
- Postgraduate Certificate in Internet of Things Systems Development
- Master of Science in Artificial Intelligence and Internet of Things

Horizontal Pathways

- Bachelor of Science in Robotics and Automation
- Bachelor of Science in Data Science and Machine Learning
- Bachelor of Science in Smart Cities and Urban Technologies

EMPLOYMENT PATHWAYS

- Artificial Intelligence and Internet of Things Systems Developer
- Smart Solutions Architect
- Machine Learning Engineer for Internet of Things Applications

- Cybersecurity Specialist for Artificial Intelligence and Internet of Things
- Artificial Intelligence-Powered Robotics Developer
- Internet of Things Network Analyst
- Smart Agriculture Technology Consultant
- Intelligent Transportation Systems Engineer

QUALIFICATION AWARD AND CERTIFICATION

Minimum condition for award is 480 credits, including one strand, learners will be awarded a Bachelor of Science in Artificial Intelligence and Internet of Things. The awarded qualification will clearly state the completed strand to reflect the learner's area of specialization. For example:

- Bachelor of Science in Artificial Intelligence and Internet of Things (Robotics)
- Bachelor of Science in Artificial Intelligence and Internet of Things (Blockchain)
- Bachelor of Science in Artificial Intelligence and Internet of Things (Natural Language Processing)
- Bachelor of Science in Artificial Intelligence and Internet of Things (Virtual and Augmented Reality)

SUMMARY OF REGIONAL AND INTERNATIONAL COMPARABILITY

Titles of Qualifications

The title of the proposed qualification, Bachelor of Science in Artificial Intelligence and Internet of Things, clearly indicates a dual specialization, combining two rapidly advancing fields. In comparison, the University of Johannesburg offers a BSc in Computer Science and Informatics (Artificial Intelligence Specialization), while South East Technological University (SETU) offers a BSc (Hons) in Applied Computing (Internet of Things). Although none of the benchmarked qualifications combine both AI and IoT in a single qualification, they do focus on either domain, making them individually relevant for comparability. The integration of both domains in this qualification represents a unique interdisciplinary offering.

NQF Levels

This qualification is aligned to the Botswana National Credit and Qualifications Framework (NCQF) at Level 7. Comparatively:

- The UJ qualification is registered on the South African NQF at Level 7, which aligns with the same level of complexity, autonomy, and responsibility expected at undergraduate level.
- The SETU qualification is aligned to the European Qualifications Framework (EQF) Level 6, which is also considered equivalent to Level 7 on the NCQF in terms of learning outcomes and depth of study.

Credit Values

This qualification carries 480 credits, including a full semester of industry attachment and mandatory specialization. In comparison:

- UJ's qualification comprises 360 South African credits, which reflects a typical 3-year degree structure.
- SETU's qualification is structured over 4 years with 240 ECTS credits, comparable in learning volume due to how the ECTS system equates 1 ECTS to 2 NCQF credits. The higher credit load in this qualification reflects broader coverage of both AI and IoT, along with work-integrated learning and specialization strands.

Main Exit Outcomes

All three qualifications prepare graduates for innovation and problem-solving in the digital economy. UJ's outcomes emphasize algorithmic thinking, AI application, and informatics. SETU's focus is more domain-specific, targeting IoT deployment in smart environments. This qualification stands out for its comprehensive integration of both AI and IoT, along with specialization options in Robotics, Blockchain, NLP, and AR/VR, offering more depth and flexibility than the single-focused comparators.

Modules and Curriculum

- UJ offers strong core modules in Computer Science, AI, and Informatics with elective options such as Robotics and Data Mining.
- SETU emphasizes core IoT domains including embedded systems, data analytics, and distributed systems, with a practical and project-driven structure.
- This qualification covers foundational computing and mathematics, followed by deep integration of AI and IoT domains, supported by modules such as Machine Learning, Computer Vision, Cloud Computing, Intelligent Systems, IoT Services and Security, and specialization strands. The breadth and integration are more comprehensive than in either benchmark.

Assessment Strategies and Weightings

Assessment in all three qualifications includes a blend of exams, practicals, and project work:

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- UJ uses 50% exams, 30% practicals, and 20% final project.
- SETU uses 40% labs, 30% capstone, and 30% summative assessments.
- This qualification aligns with these standards and places additional emphasis on continuous assessment, hands-on implementation, and a 60-credit industry attachment, which enhances employability and workplace readiness.

Rules of Combination

This qualification requires:

- 110 credits in fundamental modules,
- 325 credits in core modules,
- 45 credits from one mandatory specialization strand (Robotics, Blockchain, NLP, or AR/VR),
- 60-credit industry attachment after completing at least 195 credits.

UJ and SETU follow similar modular rules, though this qualification enforces a more structured specialization, ensuring learners graduate with clearly defined technical expertise.

Education and Employment Pathways

All three qualifications offer vertical articulation into postgraduate qualifications (e.g., Honours, Masters in AI, IoT, or Data Science). UJ and SETU graduates typically pursue roles in software development, AI/IoT engineering, and data analysis. Similarly, this qualification prepares graduates for roles such as AI Developer, IoT Systems Engineer, Robotics Designer, Smart Solutions Architect, among others complemented by its specialized strands that enhance niche skills development.

REVIEW PERIOD

The review period is **5 years**.

(Note: Please use Arial 11 font for completing the template)

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REGISTRATION STATUS	BQA DECISION NO.	REGISTRATION START DATE	REGISTRATION END DATE
LAST DATE FOR ENROLMENT		LAST DATE FOR ACHIEVEMENT	



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