QUALIFICATION SPECIFICATION								SECTION A
QUALIFICATION DEVELOPER	Botswana International University of Science and Technology							
TITLE	Bachelor of Science in Forensic Science				**NCQF LEVEL**		7	
FIELD	Natural, Mathematical and Life Sciences		**SUB-FIELD**	Forensic Sciences				
New qualification		✓	Review of existing qualification					
SUB-FRAMEWORK	General Education		TVET		Higher Education		✓	
QUALIFICATION TYPE	Certificate		Diploma		Bachelor		✓	
	Bachelor Honours		Master		Doctor			
CREDIT VALUE					522			

1.0 RATIONALE AND PURPOSE OF THE QUALIFICATION

Forensic Science is any scientific and technical knowledge that is applied to the investigation of a crime and the evaluation of evidence for the purpose of solving crime. It plays an important role in law enforcement and the criminal justice system and therefore needs to be developed to its full potential in Botswana, as a specialised field within the physical sciences. The Forensic Science Qualification, which is the first and only one of its kind in Botswana, is aimed at developing critical skills in the application of scientific principles to the investigation of criminal incidents and presenting evidence as expert witnesses to courts and tribunals. This qualification will formalize a learning pathway in the field of forensic science and will allow other professions that are linked to forensic science the opportunity to obtain advanced knowledge in this specific field and its multidisciplinary nature. Forensic science is considered a scarce skill in Botswana and neighbouring countries and has been listed as an occupation in high demand in both the 2014 and 2016 South African Government Gazettes.

The 2009 report of the Botswana Ministry of Communications, Science and Technology also stated that Forensic Specialists in Information Computer Technology (ICT) and Forensic Scientists in general were in high demand in Botswana. Industry stakeholders have endorsed the Forensic Science qualification during an industrial advisory board meeting held on 18th July 2019 and 24 March 2020 in which they indicated the relevance of the qualification in reducing time and costs related to sending samples to South Africa for testing, as well as in providing a valuable service to other organisations and entrepreneurs wanting to set up laboratories The industrial advisory board also indicated the relevance of the Forensic Science Qualification as a great resource for collaborative research, innovation and practical training. Although Forensic Scientists contribute significantly to the effective functioning of the criminal justice system and economic sustainability, forensic science is still in a very rudimentary state in countries that are part of the Southern African Development Community (SADC) such as Zambia, Malawi, Zimbabwe, Swaziland and

Mozambique.

Botswana and Namibia have good forensic science laboratories, but these are short of staff and are unable to offer the full range of forensic services required. Often times the assistance of the world-class forensic laboratories and specialists in South Africa is sought. Furthermore, it is difficult in both Botswana and Namibia for litigants and lawyers to find and engage their own forensic experts because there are very few available outside the police forensic laboratories. Other government departments with law enforcement functions, such as the Department of Wildlife and National Parks (DWNP), Botswana United Revenue Service (BURS), Botswana Defence Force (BDF) and Border Control officials, also generally lack full forensic capability. The forensic science sector, therefore, requires skilled persons to deliver on the increasing demand for competencies within this sector. The Forensic Science Qualification aims to alleviate the shortage of skilled forensic scientists in Botswana and neighbouring countries by filling critical vacancies and forms the basis for future research focused qualifications through Masters and Doctoral degrees in forensic sciences. Furthermore, the Forensic Science Qualification is aligned with the Botswana National Strategies on Education and Skills Development in Vision 2036.

1.2 PURPOSE

The purpose of Bachelor of Science in Forensic Science qualification is to produce graduates who can:

I. Demonstrate proficiency in the recognition, enhancement, preservation, recovery, scientific analysis, interpretation, evaluation and presentation of forensic evidence for purposes of the criminal justice system.
II. Operate within and adhere to professional and ethical standards and practices in the forensic science field (including quality assurance)
III. Function within the confines of relevant local and international law, judicial processes and issues requiring forensic support in Botswana and abroad.
IV. Qualify for higher education and training in forensic science or related field in support of the life-long learning principle.

2. ENTRY REQUIREMENTS (including access and inclusion)

2.1. Certificate IV NCQF Level 4 (General Education/technical and vocational education and training (TVET) with passes in Chemistry, Mathematics plus one other science subject or equivalent.
2.2. Applicants who do not meet the above criteria but possess industry experience relevant to forensic science (such as a technician or analyst in a forensic, pharmaceutical or doping control laboratory) may be considered through Recognition of Prior Learning (RPL) and Credit Accumulation and Transfer (CAT) policies for access. This consideration will be done through ETP guidelines in line with National RPL and CAT Policies.

3. QUALIFICATION SPECIFICATION **SECTION B**	
GRADUATE PROFILE (LEARNING OUTCOMES)	**ASSESSMENT CRITERIA**
Those who have awarded this qualification will be able to:	**Evidence is required that the graduate will be able to:**
3.1 Demonstrate specialised knowledge and understanding of fundamental concepts, principles and skills in forensic science in relation to crime scene investigation.	3.1.1 Use various tools, forensic kits, equipment, and techniques to visualise and recover forensic evidence at the crime scene. 3.1.2 Distinguish between the responsibilities, roles and liabilities of the individuals and agencies involved in a crime scene, and of information exchange between them. 3.1.3 Implement the 'chain of custody' principle when handling forensic evidence to maintain its integrity for court purposes. 3.1.4 Employ the correct standard operating procedures when performing forensic examinations at the crime scene. 3.1.5 Collect and record data contemporaneously, truthfully and in formats appropriate to forensic science. 3.1.6
3.2 Demonstrate advanced and specialised knowledge in scientific examination, analysis, discrimination and recording of forensic evidence in a laboratory setting for evidential use.	3.2.1 Select the appropriate forensic science equipment, instruments and techniques when analysing diverse forensic evidence from crime scenes. 3.2.2 Follow the correct standard operating procedures when performing examinations on forensic evidence in the laboratory. 3.2.3 Implement the 'chain of custody' principle when handling forensic evidence to maintain its integrity for court purposes. 3.2.4 Comply with the appropriate legislation with regard to the handling of forensic evidence. 3.2.5 Record data contemporaneously, truthfully and in formats appropriate to forensic science.
3.3 Apply the correct scientific process during evaluation, interpretation and reporting of	3.3.1 Evaluate output from instruments to determine the value of the evidence in relation to court

forensic evidence in the context of case work.	proceedings. 3.3.2 Use appropriate statistical methods to output generated during evidence evaluation in order to formulate a conclusion. 3.3.3 Distinguish between results with evidential value and those without. 3.3.4 Present results from evaluation of evidence in the form of an affidavit acceptable in the court of law.
3.4 Demonstrate specialised knowledge of the interface between forensic science and the criminal justice system, including the different legal systems and their requirements relating to forensic science within Botswana.	3.4.1 Describe the layout of a court room and the procedures followed during a court hearing. 3.4.2 Discriminate between the various role players during a court hearing. 3.4.3 Identify legislation relevant to the procedures and practice of forensic science such as handling of forensic evidence, court proceedings and presentation of forensic evidence. 3.4.4 Apply the appropriate legislation with regard to the handling of forensic evidence.
3.5 Assemble specialised forensic science information in accordance with scientific methods in aid of the criminal justice system.	3.5.1 Use appropriate search criteria in order to access information from the library, online databases and other data storage platforms in order to synthesise data during evidence evaluation. 3.5.2 Apply appropriate statistical methods to output generated during evidence evaluation in order to formulate a conclusion.
3.6 Communicate specialised scientific information efficiently and effectively to specialist and general audiences.	3.6.1 Use appropriate scientific language to produce clear and coherent written documents, which follow appropriate scientific conventions. 3.6.2 Present scientific information effectively and clearly to scientists and non-scientists alike as an expert witness during court proceedings. 3.6.3 Apply correct and appropriate verbal, non-verbal and visual forms of representation to diverse audiences. 3.6.4 Present relevant and valid arguments and conclusions from analysed data and scientific evidence in a court of law.
3.7 Use effective Information and Communication Technology (ICT) skills to	3.7.1 Perform tasks related to advanced computer literacy skills such as in blood stain patter

simulate crime scene scenarios in forensic science towards solving case work.	analysis. 3.7.2 Critically assess the validity of ICT solutions for problems posed by forensic science such as crime scene reconstruction. 3.7.3 Employ ICT databases that are appropriate to forensic science for pattern recognition, managing large volumes of data and crime scene linkages.
3.8 Work effectively as a member of a team or group in specialised forensic projects or investigations.	3.8.1 Provide evidence of successful and effective contributions in group work relating to assignments on mock crime scenes, laboratory exercises, sample handling, preparation and selection of appropriate forensic tools for analysis of evidence. 3.8.2 Communicate the outcomes of mock crime scene group work evaluations effectively and with respect to the contributions of each group member. 3.8.3 Apply organisational skills in managing group work.
3.9 Apply specialised scientific knowledge and ways of thinking to societal issues, considering ethical and cultural considerations relating to forensic science.	3.9.1 Identify forensic science knowledge that is relevant to current societal issues such as confidentiality with handling of DNA databases. 3.9.2 Critically evaluate public information dealing with forensic science issues such as organised crime and the application of analytical methods in solving such problems. 3.9.3 Make ethically and culturally sensitive decisions on the effects of scientifically based activities on society such as sampling of human and animal body fluids for toxicological analyses. 3.9.4 Use current legislation, regulations, standards and ethics when performing forensic examinations.
3.10 Undertake a research project to address current forensic science problems such as improving visualisation of latent evidence.	3.10.1 Select appropriate sampling, sample handling, preparation and analysis methodologies. 3.10.2 Collect accurate and relevant data and evaluate recent literature and discuss and present the results on a forensic research topic such as visualization of latent evidence. 3.10.3 Prepare and perform scientific experiments on

	the visualisation of latent evidence from different substrates or other types of research investigations which produce meaningful results. 3.10.4 Undertake various types of research investigations, discuss results in terms of published scientific literature and present them in the form of a written scientific report. 3.10.5 Demonstrate knowledge of various referencing conventions, plagiarism and intellectual property. 3.10.6 Engage and critique current research practices and techniques related to handling of evidence and the multidisciplinary scientific approach to solve forensic science problems.

4. QUALIFICATIONSTRUCTURE

SECTION C

	Title	**Level**	**Credits**
FUNDAMENTAL COMPONENT Subjects / Units / Modules /Courses	General Chemistry Level I	5	12
	General Chemistry Level II	6	12
	General Biology Level I	5	12
	General Biology Level II	6	12
	Pre-Calculus	5	24
	General Physics	5	24
	Introduction to Computing	5	12
	Academic Literacy Skills Level	5	12
	Technical Report Writing	6	12
	Introduction to Entrepreneurship	6	6
	Business and Entrepreneurship	7	24
	Professional Communication	6	6
CORE COMPONENT Subjects / Units / Modules /Courses	Organic Chemistry	6	12
	Analytical Chemistry	6	12
	Inorganic Chemistry	6	12
	Statistics	6	12
	Introductory Forensic Science	6	12
	Forensic Counterfeits	6	6
	Cell Biology	6	12
	Genetics	6	12

	Forensic Genetics	7	12
	Instrumental Analysis I	7	12
	Organic Spectroscopy	7	12
	Trace and Impression Evidence	7	12
	Criminalistics	7	12
	Environmental Analytical Chemistry I	7	12
	Work Based Learning	7	24
	Forensic Chemistry	7	12
	Forensic Biology	7	12
	Instrumental Analysis II	7	12
	Research Methods	7	6
	Advanced Forensic Techniques	7	12
	Research Project in Forensic Science	7	12
	Crime Scene to Court	7	12
	Environmental Analytical Chemistry II	7	12
	Forensic Case Studies	7	6
ELECTIVE COMPONENT Subjects / Units / Modules /Courses	Computer Science	7	12
	General Microbiology	6	12
	General Biochemistry	6	12
	Molecular Biology	7	12
	Digital Forensics	7	12
	Advanced Computer Forensics	7	12
	Recombinant DNA Technologies	6	12
	Toxicology and Biosensors	6	12
	Advanced Computer Science	7	12
	Multimedia Forensics	7	12

Rules of combinations, Credit distribution (where applicable):

Rule

The distribution of the credits at different levels is as follows:

Table 1. Credit Distribution

NCQF Level	Credit Contribution
Level 5	96
Level 6	162
Level 7	264
Total Credits	522

Table 2. Credit Contribution for Fundamental and Core modules

Component	Credit Contribution
Fundamental modules	168
Core Modules	282

Electives	72
Total	522

Candidates are required to select six electives from the options given. The electives are designed to allow students to focus on an area of their interest within the forensic science discipline.

5.0 ASSESSMENT AND MODERATION ARRANGEMENTS

ASSESSMENT ARRANGEMENTS

All assessments, formative and summative, leading/contributing to the award of credits or a qualification shall be based on learning outcomes and/or sub-outcomes.

5.1 Formative Assessment/Continuous Assessment
Formative assessment will contribute 30-50% towards the final grade.

5.2 Summative Assessment
Summative assessment will contribute 50-70% of the final grade. Assessors must be BQA registered and accredited.

5.3 MODERATION ARRANGEMENTS

There will be provision for internal and external moderation for the qualification. Moderators must be BQA registered and accredited. Both internal and external moderation will be done in-line with institutional and national policies.

6.0 RECOGNITION OF PRIOR LEARNING (if applicable)

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 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.

7.0 PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

This qualification is designed to facilitate vertical and horizontal progression both locally and internationally.

7.1 Horizontal Progression

Graduates of the Bachelor of Science in Forensic Science qualification may progress horizontally in qualifications such as.

- Bachelor of Science in Forensic Chemistry
- Bachelor of Science in Chemistry (Drug Design and Development)
- Bachelor of Science in Chemistry (Environmental and Analytical Chemistry)

- Bachelor of Forensic Psychology
- Bachelor of Science Forensic Anthropology
- Bachelor of Science Forensic Biology
- Bachelor of Science in Criminology

7.2 Vertical progression – Exit

Graduates of the Bachelor of Science in Forensic Science qualification may progress to level 8/9 qualifications such as;

- Bachelor of Science (Honours) in Forensic Toxicology
- Bachelor of Science (Honours) in Forensic Chemistry
- Bachelor of Science (Honours) in Forensic Biology
- Bachelor of Science (Honours) in Forensic and Transnational crimes
- Bachelor of Science (Honours) in Chemistry (Environmental and Analytical Chemistry)
- Bachelor of Science (Honours) in Chemistry (Drug Discovery and Development)

7.4 Employment Pathways

Graduates of the qualification may find employment in a range of public and private organisations for the following positions;

i. Laboratory forensic scientists
ii. Laboratory technicians
iii. Toxicology analysts
iv. Police/army officers
v. Crime scene investigators
vi. Fire/Arson investigators
vii. Wildlife forensic experts
viii. Customs and Border forensic experts
ix. Laboratory scientists
x. Research scientists in Forensic science
xi. Entrepreneurs

8.0 QUALIFICATION AWARD AND CERTIFICATION

8.1. Qualification Award

A candidate will be awarded a Bachelor of Science in Forensic Science qualification upon meeting the minimum of 522 credits as prescribed in the rules of combination as well as applicable institutional and national policies.

8.2. Certification

A certificate and transcript will be issued to graduates upon successful completion of the Bachelor of Science in Forensic Science qualification in accordance with standards prescribed through applicable institutional and

national policies.

9.0 REGIONAL AND INTERNATIONAL COMPARABILITY

University of Hull, UK, Bachelor of Science Forensic Science (Honours) (Framework for Higher Education Qualifications Level 6) 360 Credit

The UK admission requires an A-level with 112 points; applicants should have A level Biology/Applied Science at Grade C or above (or merit from relevant BTEC). Applicants taking the reformed A-level must also Pass the practical element A Level Chemistry may also be considered. Thus, A-level will be equivalent to Level 5 of the proposed qualification. It is noticeable that Mathematics, Statistic and other sciences are not listed as covered domains. The course consists of 120 credits per year with most modules consisting of 20 credits. This means that students will studqy around six modules each year. In cases where longer modules such as a dissertation, which can be worth more (e.g. 40 credits) are taken, students will study fewer modules but the number of credits still add up to 120.The Learning outcomes to develop an in-depth knowledge and skills in forensic science which include the investigation of crime scenes, analysis evidence in labs and presentation of expert testimony in court as seen from the listed domains.

Deakin University, Australia, Bachelor of Forensic Science (Australian Qualifications Framework Level 7) 24 Credit

This is another similar qualification which asserts that their learners will learn to confidently examine, interpret and present forensic evidence, by building foundational knowledge of the science behind forensics. Unlike the proposed qualification, Deakin University students are given a choice to customise their degree to suit their interests by selecting a major in forensic biology or forensic chemistry. Both forensic chemistry and biology are modules integrated within the qualification as core subjects, with students having to enroll in both. 1 subject is equivalent to 1 credit and hence students are required to take 24 subjects over the course of the qualification (equivalent to 4 subjects per semester). Of the 24 subjects, 11 must be core. Both qualifications are similar in that students can apply modern forensic analysis in authentic environments like purpose-built crime scene training facility. The Learning outcomes to develop an in-depth knowledge and skills in forensic science which include the investigation of crime scenes, analysis evidence in laboratories and presentation of expert testimony in court are also emphasized as seen from the listed domains. For admission into the course, applicants with recent secondary education (previous three years) are based on their performance in a Senior Secondary Certificate of Education, with pre-requisite units 3 and 4; a study score of at least 25 in English EAL (English as an additional language) or 20 in English other than EAL. Applicants are selected in accordance with the published Australian Tertiary Admission Rank (ATAR) for that year. Recognition of Prior Learning is only applied for post graduate qualifications.

University of the Free State, South Africa, Bachelor in Forensic Science (National Qualifications Level 7), 360 Credit

Admission to BSc majoring in Forensic Sciences is subject to selection. A minimum admission point (AP) of 34 is required, with a cumulative AP score of at least 17 for Mathematics, Life Sciences, and Physical Science. Students take core and fundamental modules in and specialise in forensic genetics, forensic chemistry or forensic entomology in their final year. This qualification focuses on how science can be used to analyse and interpret different crime scenes. This includes Chemistry, Physics, Genetics, and Entomology. After completion of this study, the student will have a thorough basic knowledge of the physical and biological science aspects of forensic sciences. The qualification runs over 3 years and students take 4 courses each semester, with 16 credits per course. Core modules are prescribed but students have various electives to

select from depending on their area of specialisation, which is a format also applied in the proposed qualification.

Similar to the proposed qualification, the first year of study provides students with the opportunity to develop a broad scientific foundation and students are normally required to complete eight modules (at least 120 credits per year, four modules per semester). These modules serve as the foundation for specialisation in the subsequent years. In the second year of study, majors are selected (at NQF Level 6), supplemented with modules from supportive disciplines. As with the proposed qualification, learning programmes provide students with the opportunity to select modules from related supportive disciplines to ensure purposeful qualifications. In the third year of study, students must specialise in two major fields of study, for example forensic genetics and forensic chemistry or forensic chemistry and forensic entomology (at NQF Exit Level 7), with a total of at least 60 credits completed for each major. Furthermore, students may also be required to complete other modules to ensure that they have the necessary knowledge and literacy required to function in a demanding academic environment, which correlates with the proposed qualification.

NQF comparability notes

In terms of NQF levels, the United Kingdom quality assurance agency (QAA) using Frameworks for Higher Education Qualifications and Credit (FHEQ) denotes a BSc with 300 credits. But, the Qf-EHEA (Qualification framework of the European Higher Education Area) awards 180-240 ECTS credits. The Australian Qualifications Framework (AQF) places BSc at level 7.

10.0 REVIEW PERIOD

Review period is 5 years or as and when the need arises.

Other information – please add any supplementary information to help the application for this qualification for NCQF Registration.

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**	