| QUALIFICATION SPECIFICATION | | | | | | | | SECTION A |
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| **QUALIFICATION DEVELOPER** | Botswana International University of Science and Technology | | | | | | | |
| **TITLE** | Bachelor of Science (Honours) in Forensic Science | | | | **NCQF LEVEL** | | 8 | |
| **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** | | | | | 126 | | | |

## 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-based 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 the 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. A Bachelors Degree NCQF Level 7 in Forensic Science or Related Field.
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<br>SECTION B | |
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| **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 highly specialised advanced knowledge and understanding of fundamental concepts, principles and skills in forensic science in relation to crime scene investigation. | 3.1.1 Apply a multidisciplinary approach to the recognition, enhancement, preservation, and recovery of latent and visible forensic evidence from crime scenes.<br>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.<br>3.1.3 Implement the 'chain of custody' principle when handling forensic evidence to maintain its integrity for court purposes.<br>3.1.4 Employ the correct standard operating procedures when performing forensic examinations at the crime scene.<br>3.1.5 Collect and record data contemporaneously, truthfully and in formats appropriate to forensic science.<br>3.1.6 Use various tools, forensic kits, equipment, and techniques on forensic evidence at the crime scene. |
| 3.2 Demonstrate highly 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.<br>3.2.1 Follow the correct standard operating procedures when performing examinations on forensic evidence in the laboratory.<br>3.2.2 Implement the 'chain of custody' principle when handling forensic evidence to maintain its integrity for court purposes.<br>3.2.3 Comply with the appropriate legislation with regard to the handling of forensic evidence.<br>3.2.4 Record data contemporaneously, truthfully and |

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| | in formats appropriate to forensic science. |
| 3.3 Plan and manage the correct scientific process during evaluation, interpretation and reporting of forensic evidence in the context of case work. | 3.3.1 Evaluate output from instruments to determine the value of the evidence in relation to court proceedings.<br>3.3.2 Use appropriate statistical methods to output generated during evidence evaluation in order to formulate a conclusion.<br>3.3.3 Distinguish between results with evidential value and those without.<br>3.3.4 Identify the difference between Inductive and deductive reasoning when evaluating evidence for purposes of the court.<br>3.3.5 Employ deductive and inductive reasoning and cause effect reasoning to results from evidence evaluation.<br>3.3.6 Present results from evaluation of evidence in the form of an affidavit acceptable in the court of law. |
| 3.4 Demonstrate highly 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.<br>3.4.2 Discriminate between the various role players during a court hearing.<br>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.<br>3.4.4 Apply the appropriate legislation with regard to the handling of forensic evidence. |
| 3.5 Assemble highly 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.<br>3.5.2 Apply appropriate statistical methods to output generated during evidence evaluation in order to formulate a conclusion. |
| 3.6 Articulate highly specialised scientific information efficiently and effectively to specialist and audiences. | 3.6.1 Use appropriate scientific language to produce clear and coherent written documents, which follow appropriate scientific conventions.<br>3.6.2 Present scientific information effectively and clearly to scientists and non-scientists alike as an expert witness during court proceedings. |

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| | 3.6.3 Apply correct and appropriate verbal, non-verbal and visual forms of representation to diverse audiences.<br>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 simulate crime scene scenarios in forensic science towards solving highly specialised case work. | 3.7.1 Perform tasks related to advanced computer literacy skills such as in blood stain patter analysis.<br>3.7.2 Critically assess the validity of ICT solutions for problems posed by forensic science such as crime scene reconstruction.<br>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 highly 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.<br>3.8.2 Communicate the outcomes of mock crime scene group work evaluations effectively and with respect to the contributions of each group member.<br>3.8.3 Apply organisational skills in managing group work. |
| 3.9 Apply highly 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.<br>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.<br>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.<br>3.9.4 Use current legislation, regulations, standards |

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| | and ethics when performing forensic examinations. |
| 3.10 Undertake highly specialised research projects to address forensic science problems such as improving visualisation of latent evidence. | 3.10.1 Select appropriate sampling, sample handling, preparation and analysis methodologies.<br>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.<br>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.<br>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.<br>3.10.5 Demonstrate knowledge of various referencing conventions, plagiarism and intellectual property.<br>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. |
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**4. QUALIFICATIONSTRUCTURE**

**SECTION C**

| **FUNDAMENTAL COMPONENT** Subjects / Units / Modules /Courses | **Title** | **Level** | **Credits** |
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| **CORE COMPONENT** Subjects / Units / Modules /Courses | Doping in Sport and Quality Assurance | 8 | 12 |
| | Crime Scene Investigation, Reconstruction And Management | 8 | 12 |
| | Advanced Forensic DNA Methods | 8 | 12 |
| | Advanced Research Project in Forensic Science | 8 | 30 |
| | Advanced Forensic Toxicology | 8 | 12 |
| | Wildlife Forensics | 8 | 12 |
| | Controlled Substances | 8 | 12 |
| | Organised Crime | 8 | 12 |
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| **ELECTIVE COMPONENT** Subjects / Units / Modules /Courses | Environmental Forensics | 8 | 12 |
| | Cyber Security and Computer Forensics Capstone | 8 | 12 |

**Rules of combinations, Credit distribution** (where applicable):

**Rule**

BQA rules require that a minimum total of 120 credits are required at level 8 or above in addition to those credits required to attain a Bachelor's Degree dissertation at honors level. A minimum of 30 credits at level 8 must be research based. The current qualification has all its credits at level 8 or higher and so meets the rules of combination.

In order for this qualification to be awarded the qualifying graduate must have acquired a minimum of **126** credits.

Candidates are required to select and register for only one elective 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 (Honours) in Forensic Science qualification may progress horizontally in qualifications such as.

- Bachelor of Science (Honours) in Forensic Chemistry
- Bachelor of Science (Honours) in Chemistry (Drug Design and Development)
- Bachelor of Science (Honours) in Chemistry (Environmental and Analytical Chemistry)
- Bachelor of Forensic Psychology (Honours)
- Bachelor of Science (Honours) in Forensic Anthropology
- Bachelor of Science (Honours) in Forensic Biology
- Bachelor of Science (Honours) 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;

- Masters in Forensic Toxicology
- Masters in Forensic Chemistry
- Masters in Forensic Biology
- Masters in Forensic and Transnational crimes
- Masters in Chemistry (Environmental and Analytical Chemistry)
- Masters 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 (Honours) in Forensic Science qualification upon meeting the minimum of 120 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 (Honours) in Forensic Science qualification in accordance with standards prescribed through applicable institutional and national policies.

## 9.0 REGIONAL AND INTERNATIONAL COMPARABILITY

**Bournemouth University, Bachelor in Science (Honours) in Forensic Science (FHEQ Level 6) 360 Credit Points**

This qualification can be acquired as a sandwich which requires 120 Level 6 credits, 120 Level 5 credits and 120 Level 4 credits and successful completion of a placement year or as a standard Undergraduate degree where students are required to achieve 120 Level 6 credits, 120 Level 5 credits and 120 Level 4 credits. Knowledge and understanding are acquired through lectures, tutorials, practicals and group work activities and research project meetings. Learners are expected to review published sources to investigate a range of key concepts and case study material. In some cases, they will be involved in collecting their own data or being given realistic data related to forensic and/or crime scene science. Learners are expected to undertake their own research as part of the directed or independent research project. Subject specific learning outcomes are attained through lectures, group exercises that may include practicals and workshops, and the research project. The qualification is comprised of three core modules, one of which is a research project (40 credit points) and two electives. The BIUST qualification proposes seven modules, a research project (30 credit points) and one elective. Otherwise the learning outcomes for both qualifications are same.

**University of Derby, Bachelor in Science (Honours) in Forensic Science (Framework for Higher Education Qualifications Level 7) 360 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. There are specific requirements for A-level admission are that the learner should obtain at least a C in Biology and/or Chemistry at A-level (or equivalent qualification). This also includes Applied Science, a BTEC Science subject or Access Science. Specific requirements at GCSE are that a learner should have obtained GCSE Maths and English Grade C/Grade 4 (or above) or equivalent qualification. This qualification compares to the BIUST proposed qualification in that students can practice modern forensic analysis skills 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.

**University of the Free State, South Africa, Bachelor in Forensic Science (Honours) (Level 8), 120 Credit Points**

Admission into BSc Hons in Forensic Sciences is subject to selection. A minimum of 60% in relevant modules

at NQF level 7 or equivalent modules. Students specialise in forensic genetics, forensic chemistry or forensic sciences which differs from the proposed qualification where students take specialist courses in all the three areas. This qualification focuses on advanced techniques in forensic science, crime scene investigation and management and a research project which is similar to the proposed qualification. After completion of this study, the student will have advanced knowledge of the physical and biological science aspects of forensic sciences. The qualification runs over 1 year, similar to the proposed qualification, and students take 6 courses during the duration of the qualification, with 20 credits per course. There are no electives offered.

**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** |
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| **LAST DATE FOR ENROLMENT** | | **LAST DATE FOR ACHIEVEMENT** | |
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