BOTSWANA Qualifications Authority	**BQA NCQF QUALIFICATION TEMPLATE**	Document No.	DNCQF.QIDD.GD02
		Issue No.	01
		Effective Date	04/02/2020

SECTION A: QUALIFICATION DETAILS					
QUALIFICATION DEVELOPER (S)	University of Botswana				
TITLE	Bachelor of Industrial Design			**NCQF LEVEL**	7
FIELD	Manufacturing, Engineering & Technology	**SUB-FIELD**	Industrial Design	**CREDIT VALUE**	480

New Qualification	✓	Review of Existing Qualification	

SUB-FRAMEWORK	General Education		TVET		Higher Education	✓

QUALIFICATION TYPE	Certificate	I		II		III		IV		V		Diploma		Bachelor	

Bachelor Honours	✓	Post Graduate Certificate		Post Graduate Diploma	
Masters		Doctorate/ PhD			

RATIONALE AND PURPOSE OF THE QUALIFICATION

RATIONALE:

The qualification has been designed to respond to the social and economic needs of Botswana and that of the region, especially in areas that deal with design, technology, creativity, and innovation to provide the society with innovators and designers. It is also aligned to the key strategic sectors of creative industries; research, innovation, science and technology, and manufacturing as identified by Human Resource Development Council which requires a high demand of manpower to transform Botswana into a creative and knowledge-based

economy. The qualification's core mandate is to train secondary school leavers to be industrial designers and entrepreneurs. The qualification is in congruence with the Faculty of Engineering and Technology's vision of being the leading centre of excellence in engineering, design and the built environment in the world. The Bachelor of Design (Industrial Design) qualification has been developed in line with outcome-based learning principles. The development of the qualification has been informed by the accreditation requirements of the Institution of Engineering Designers. The qualification contributes towards the strategic role of meeting the country's development needs through advancing human resource development and developing research and innovation capacity (Towards a knowledge Society. Tertiary Education Policy, 2010; Revised National Policy of Education 1994; National Human Resource Development Plan, 2009-2022, Education and Training Sector Strategic Plan, 2015, National Development Plan 11, 2017 and HRDC, 2019 top occupations priority area - manufacturing). Furthermore, this qualification is considered to be commensurate with three of the pillars of Vision 2036 of producing 'sustainable economic development, human and social development and sustainable environment', as well as two key future imperatives of 'innovation and sustainability'.

PURPOSE

The purpose of this qualification is to produce graduates with Knowledge, Skills and Competences to:

- Design and manufacture versatile, disruptive, innovative, and creative products, systems and services using advanced manufacturing processes that solve real-life problems in the society.
- Manage a design studio/workshop in selecting appropriate materials, production processes, business strategy, and prevailing social, commercial, or aesthetic attitudes when designing products and services.
- Provide solutions for problems of form, function, usability, ergonomics, marketing, brand development, sustainability, and sales to the user.
- Apply knowledge and skills of industrial design to entrepreneurial solutions.

ENTRY REQUIREMENTS (including access and inclusion)

The normal requirements for entrance to the Bachelor of Industrial Design Degree qualification shall be:

- Certificate IV, NCQF Level 4.

- Recognition of prior learning and credit accumulation and transfer shall be considered.

SECTION B QUALIFICATION SPECIFICATION	
GRADUATE PROFILE (LEARNING OUTCOMES)	**ASSESSMENT CRITERIA**
1.1 Solve complex industrial design problems.	1.1.1 Use the appropriate Mathematical, Science and Engineering principles to a given design task/problem. 1.1.2 Apply research methodologies and techniques relevant to industrial design to solve complex problems.
1.2 Apply engineering analysis in solving industrial design problems.	1.2.1 **C**onduct research, select, evaluate, manipulate, and manage information relevant to the analysis and synthesis of de sign and technology solutions. 1.2.2 Apply analytical skills in relation to designed objects against their context. 1.2.3 Undertake visual analysis. 1.2.4 Use a systematic approach to problem-solving using appropriate design tools and techniques.
1.3 Apply design practice principles in practising industrial design.	1.3.1 Create new processes or products through a synthesis of ideas based on material selection principles. 1.3.2 Practise collaborative and independent work to realise a range of practical, creative, and theoretical projects. 1.3.3 Initiate projects, meet deadlines, liaise with industrial collaborators, and make presentations. 1.3.4 Conduct research and synthesize information, produce reports, and evaluate designs. 1.3.5 Analyse problems of a creative nature and provide appropriate solutions.

	1.3.6 Apply intellectual property rights (IPR) including patent search and principles of copyright and design registration. 1.3.7 Use engineering design codes of practice and industry standards, with some knowledge of design factors and requirements for safe operation. 1.3.8 Demonstrate awareness of management and quality assurance issues in product design. 1.3.9 Work effectively as part of a group with respect for the dignity, rights and needs of others. 1.3.10 Manage time and projects in professional practice. 1.3.11 Use information and communication technology (digital skills) in data collection. 1.3.12 Evaluate technical risks and address risk in design methodology. 1.3.13 Write design reports and present design ideas.
1.4 Demonstrate knowledge and understanding of economic, social, and environmental context in the practice of industrial design.	1.4.1 Manage the design process. 1.4.2 Demonstrate an awareness of financial, economic, social legislative and environmental factors of relevance to industrial design. 1.4.3 Use sustainable design principles in solving problems.
1.5 Design products, services, and systems as per the user needs.	1.5.1 Evaluate design solutions against relevant constraints and criteria. 1.5.2 Address human needs using research, anthropometric data, and ergonomic principles. 1.5. 3 Provide design solutions according to customer and user requirements. 1.5.4 Generate product design specifications.

	1.5.5 Use product design cost drivers and appreciate the cost implications of different production volumes. 1.5.6 Generate a wide range of design ideas, concepts, and proposals independently and in teams in response to set or self-generated design briefs. 1.5.7 Select and test materials and manufacturing processes in the synthesis of product design solutions. 1.5.8 Create logical and innovative design solutions. 1.5.9 Select and use the appropriate manual drawing/construction/CAD, communication and technological media in the realisation of design ideas. 1.5.10 Use visual literacy and drawing ability appropriate to the practice of product design. 1.5.11 Develop concepts to provide manufacturing instructions and specifications. 1.5.12 Design through computer modelling and visualisation. 1.5.13 Integrate design and technology education aspects including form texture and colour.
1.6 Demonstrate proficiency in professional and technical communication, and the use of digital skills in complex problem-solving.	1.6.1 Present academic, professional ideas orally, visually, and textually to a range of audiences. 1.6.2 Offer creative insights, rigorous interpretations and solutions to problems and issues appropriate to the context. 1.6.3 Research, analyse, organize data, and retrieve information using ICT /digital skills. 1.6.4 Demonstrate sound sketching, drawing and computer-aided and computer-aided

	manufacturing skills in designing products, services, and systems. 1.6.5 Manage and present information in a variety of formats using ICT/digital skills.
1.7 Practise design professionalism.	1.7.1 Apply ethical considerations when designing sustainable products, services, and systems. 1.7.2 Identify and address ethical issues in design and technology education. 1.7.3 Take full responsibility for own work, decision-making and use of resources. 1.7.4 adhere to industrial design ethics.
1.8 Demonstrate an advanced knowledge and understanding of entrepreneurship.	1.8.1 Build and present a business plan. 1.8.2 discuss available funding options, entrepreneurial finance, and marketing strategies. 1.8.3 Manage enterprises. 1.8.4 Apply entrepreneurial skills needed by the creative and innovative leader.
1.9 Engage in Continuous Professional Development activities to enhance own performance and practice.	1.9.1 Develop a personal Professional Development Plan (PDP) in the field of Industrial Design. 1.9.2 Identify accredited education and training providers to be considered in relation to own PDP. 1.9.3 Initiate arrangements for supporting the implementation of the PDP. 1.9.4 Evaluate own actions or performance and make judgements about what to do to improve. 1.9.5 Initiate ideas and seek support to improve performance.

SECTION C		**QUALIFICATION STRUCTURE**				
COMPONENT	**TITLE**	**Credits Per Relevant NCQF Level**				**Total (Per** Subject/ Course/ Module/ Units)
		Level [5]	**Level [6]**	**Level [7]**	**Level [8]**	
FUNDAMENTAL COMPONENT Subjects/ Courses/ Modules/Units	Geometrical Optics & Mechanics, Vibrations Waves.	12				12
	Design Mathematics	18				18
	Computer Skills Fundamentals.	12				12
	Introduction to Communication & Academic Literacy Skills.	9				9
	Electricity, Magnetism & Elements of Modern Physics.	12				12
	Academic and Professional Communication.	9				9
CORE COMPONENT Subjects/Courses/ Modules/Units	Elements & Principles of Design.		9			9
	Design Fundamentals		9			9
	Design Materials & Processes.		18			18
	Graphical Communication.		18			18
	Design for Sustainability.		9			9
	History of Art & Design.		9			9

	Product Design Studio: Electronics.		9			9
	Graphical Communication & Multimedia.		9			9
	Product Styling.		9			9
	Physical Ergonomics.		9			9
	Design Studio: Structures & Mechanisms.		9			9
	Principles of Marketing		9			9
	Industrial Design Attachment		9	12	12	33
	Design Futures.			9		9
	Intellectual Property Rights.			9		9
	Computer-Aided Design Fundamentals.			9		9
	Design Research.			9		9
	Product Design & Analysis.			9		9
	Occupational Health and Safety in Design.			9		9
	Computer-Aided Design & Manufacture.			9		9
	Design Control Technology I.			9		9
	Integrated Design Practice.			9		9
	Design Studio: Cognitive Ergonomics.			9		9
	Service Design for Sustainability.			9		9
	Design & Entrepreneurship.			9		9
	Design Studio: Teamwork Projects.			9		9

	Interior Product Design			9		9
	Design Studio: Design for All			12		12
	Branding & Packaging Design.			9		9
	Major Design Project I: Research & Conceptualization.				18	18
	Emerging Issues in Design.				9	9
	Major Design Project II: Prototyping.				21	21
ELECTIVE/ OPTIONAL COMPONENT Subjects/Courses/ Modules/Units	Design for Print Media.			9		9
	Microcomputers Control for Designers.			9		9
	Advanced Computer Aided Design.			9		9
	Ceramic Design.			9	9	9
	System Design for Sustainability.			9		9
	Interactive Design.				9	9
	Advanced Ceramic Design.				9	9
	Entrepreneurship & New Business Formation.				9	9
	Environmental Communication Design.				9	9

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF L3EVEL
TOTAL CREDITS PER NCQF LEVEL

NCQF Level	Credit Value
Level 5 modules	72 credits
Level 6 modules	129 credits
Level 7 modules	207 credits
Level 8 modules	72 credits
TOTAL CREDITS	**480**

Rules of Combination:

A candidate will obtain the qualification by completing the:

i. Fundamentals Level 5 modules: 72 credits.
ii. Level 6 modules: 135 credits.
iii. Level 7 modules: 159 credits.
iv. Level 8 modules: 60 credits.
v. Electives Level 7+8: 54 credits (Learners opt for 3 elective components at Level 7 and another 3 at Level 8 to satisfy the qualification requirements).

Total credits: 480 credits.

ASSESSMENT ARRANGEMENTS

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

Formative assessment

Formative assessment will contribute 60% towards the award of the final mark.

Summative assessment

Summative assessment will contribute 40% to the final mark.

MODERATION ARRANGEMENTS

The qualification shall have internal and external moderation following applicable policies and regulations for quality assurance to ensure fairness, validity, reliability, and consistency of assessments. The moderators shall be registered and accredited by the Botswana Qualifications Authority.

RECOGNITION OF PRIOR LEARNING

Learners 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 policy, credit accumulation and transfer system and relevant national-level policy and legislative framework.

CREDIT ACCUMULATION AND TRANSFER

The Credit Accumulation and Transfer System shall be used for credit transfer between institutions of higher learning.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Horizontal Articulation (related qualifications of a similar level (NCQF Level 7) that graduates may progress to):

Bachelor Arts Industrial Design & Technology; Bachelor Arts Product design; Bachelor Arts Design Products; Bachelor Arts Sustainable Product Design; Bachelor Arts Design for Industry; Bachelor Arts Furniture & Product Design; Bachelor of Science Product Design & Technology; Bachelor of Design Industrial Design; Bachelor of Design Product Design; Bachelor of Fine Arts Industrial Design; Bachelor of Fine Arts Product Design.

Vertical Articulation (NCQF Level 8) qualifications to which the holder may progress to:

Bachelor Arts (Hons) Industrial Design & Technology; Bachelor Arts (Hons) Product design; Bachelor Arts (Hons) Design Products; Bachelor Arts (Hons) Sustainable Product Design; Bachelor Arts (Hons) Design for Industry; Bachelor Arts (Hons) Furniture & Product Design; Bachelor of Science (Hons) Product Design & Technology; Bachelor of Design (Hons) Industrial Design; Bachelor of Design (Hons) Product Design; Bachelor of Fine Arts (Hons) Industrial Design; Bachelor of Fine Arts (Hons) Product Design.

Employment

Industrial designers; product designers; graphic designers; design educators; entrepreneurs; furniture designers; interior designers; jewellery designers; staff development fellows; occupational health and safety officers; service designers; social innovators; model makers; illustrators, etc.

QUALIFICATION AWARD AND CERTIFICATION

Minimum standards of achievement for the award of the qualification

To be awarded a Bachelor of Industrial Design, a learner should have satisfied all exit learning outcomes, met the minimum credit requirements (480 credits) which is made up of fundamental/core/elective components as indicated in the qualification structure.

Certification

For a leaner to be awarded a Bachelor of Industrial Design qualification, he/she should have achieved a minimum of 480 credits. After satisfying all the requirements, a learner will be awarded a certificate of a Bachelor of Industrial Design.

REGIONAL AND INTERNATIONAL COMPARABILITY

A comparability of the current qualifications was conducted against regional qualifications at the University of Johannesburg (https://www.uj.ac.za/) and Cape Peninsula University of Technology (https://www.cput.ac.za/) in South Africa and internationally at Loughborough University (https://www.lboro.ac.uk/) and Brunel University London (https://www.brunel.ac.uk/) in the United Kingdom.

University of Johannesburg (South Africa) offers a 3-year Bachelor of Arts Industrial Design qualification which is at Level 7 and the total number of credits is 480.

The exit level outcomes are to:

- Demonstrate professionally acceptable product design skills.
- Demonstrate advanced product design knowledge and awareness.
- Demonstrate knowledge and skills to the professional practice of Industrial Design.

The domain covered include:
Design solutions for the international arena; Design for development; Academic and philosophical issues surrounding Industrial Design; Professional language skills; Relationship between the profession and industry in South Africa and the international arena and Industrial Design practice.

The assessment strategies include written tests, examinations, and practical project work.
The learner will be awarded a qualification after achieving the stated learning outcomes.

Employment pathways include design consultancy, in-house design, manufacturer of products, designer/maker, model maker, illustrator, etc.

Cape Peninsula University of Technology (South Africa) offers a 3-year Bachelor of Technology Industrial Design qualification which is at Level 7 and the total number of credits is 480.

The exit level outcomes are to:

- Equip students with the knowledge and skills to apply the design process to problems related to mass-produced products, to produce conceptual sketches, technical specifications, rendered images and physical or virtual 3D models to communicate proposed solutions in a professional way.
- Participate confidently in debates around current design thinking and movements, based on historical reference and position the results of their work in the business framework that generated the need for the design input.
- Demonstrate professionally acceptable product design skills; demonstrate advanced product design knowledge and awareness and demonstrate knowledge and skills to the professional practice of Industrial Design.

The domain covered include Design solutions for the international arena; Design for development; Academic and philosophical issues surrounding Industrial Design; Professional language skills; Relationship between the profession and industry in South Africa and the international arena and Industrial Design practice.

The assessment strategies include written tests, examinations, and practical project work.

The learner will be awarded a qualification after achieving the stated learning outcomes.

Employment pathways include design consultancy, in-house design, manufacturer of products, designer/maker, model maker, illustrator, etc.

Loughborough University (United Kingdom) offers a 3-year BA (Hons) Industrial Design and Technology qualification, which is at FHEQ Level 6 and it has 480 Credits.

The exit learning outcomes are to:

- demonstrate the understanding of designing, with particular attention to the practitioners, the principles and practice of industrial design and their technological bases.
- demonstrate imaginative and creative abilities.
- demonstrate application of appropriate modelling methods to design development; demonstrate the ability to contextualize and discuss the significance and implications of design activity and its outcomes.
- demonstrate effective verbal, visual and technical presentation, and communication skills.

The domain areas are design practice; Sustainable design; Design communication; Prototyping and manufacturing techniques; Design technology and entrepreneurship and innovation.

Assessment strategies include reports, CAD files, essays, assessed laboratory sessions, class tests, group presentations and reports, submission of prototypes, folios, logbooks, e-posters, presentation boards, computer simulations & examinations.

Qualification rules and minimum standards for the award of the qualification is not stated.

Employment pathways include Digital designer, Trainee design engineer; Innovation designer, Industrial CAD designer, Product engineer, Product designer and Industry designer.

Brunel University (United Kingdom) offers a 3-year BA (Hons) Industrial Design qualification, which is at FHEQ Level 6 and it has 480 Credits.

The exit learning outcomes are to:

- demonstrate a sound knowledge and broad understanding of the technological, manufacturing, and creative aspects of design.
- demonstrate a good combination of commercial awareness with creative and inspirational thought validated by sound technological reasoning, defined through the design process.

The domain areas include Commercial awareness, aesthetics, and market trends; Technical focus (mechanics and electronics); Problem solving through creativity and innovation and interdisciplinary project-based working.

Assessment strategies include written and multiple-choice examinations; laboratory reports; written coursework; individual and group design projects; problem-solving exercises; oral presentation; visual media projects and computer programming exercises.

Employment pathways include design consultancy, in-house design, manufacturer of products, designer/maker, model maker, illustrator, etc.

Similarities

- Equal number of credits (480) and level 8
- Employability pathways are more or less the same even though more articulated in UK institutions.
- Domains are more or less the same but articulated differently.
- Assessment is practically oriented, and outcome based.

Differences

- UK degrees are all Honors while SA ones offer honors as an option for an additional year.
- Qualification frameworks also differ. A UK FHEQ Level 6 is comparable to a South African NQF Level 8. South Africa and Botswana degrees are NQF Level 7.
- South Africa qualifications are BTech and BA and have a vocational focus while UK ones are BA with strong technical foci.

Although the exit level outcomes for the qualifications in the region relate to the theory, concepts and methods pertaining to industrial design, they appear to be less articulate when compared to the 2 international qualifications. The outcomes are detailed in terms of how they relate to adaptability, flexibility, ability to cope with the dynamics in the world of work and exercising initiative in the enterprising world of industrial design practice. The Bachelor of Design (industrial Design) qualification aligns and compares more with the 2 international qualifications, especially in terms of the combination of a technical focus and the art of design and sustainability. This is a distinct feature for this qualification in the region and provides for international mobility of graduates since this is the future direction for industrial design. The qualification caters for vertical articulation

to masters and PhD in industrial/product design, design management, design strategy, manufacturing, design, and business. It prepares graduates for similar careers with the benchmark qualifications, with an additional advantage of potential employment in the service industry due to the service design for sustainability aspect of the qualification.

REVIEW PERIOD

The qualification will be reviewed every five years.

Submitted by: Dr Yaone Rapitsenyane  18/02/2021