No. 929 **25 September 2009**

SOUTH AFRICAN QUALIFICATIONS AUTHORITY (SAQA)

In accordance with Regulation 24(c) of the National Standards Bodies Regulations of 28 March 1998, the Task Team for

Radiography and Clinical Technology

registered by Organising Field 09 – Health Sciences and Social Services, publishes the following Qualification for public comment.

This notice contains the titles, fields, sub-fields, NQF levels, credits, and purpose of the Qualification. The full Qualification can be accessed via the SAQA web-site at **www.saqa.org.za**. Copies may also be obtained from the Directorate of Standards Setting and Development at the SAQA offices, SAQA House, 1067 Arcadia Street, Hatfield, Pretoria.

Comment on the Qualification should reach SAQA at the address below and ***no later than 26 October 2009.*** All correspondence should be marked **Standards Setting – Task Team for Radiography and Clinical Technology** and addressed to

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ACTING DIRECTOR: STANDARDS SETTING AND DEVELOPMENT

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:
Bachelor of Radiography: Radiation Laboratory Technology

SAQA QUAL ID	*QUALIFICATION TITLE*		
74349	Bachelor of Radiography: Radiation Laboratory Technology		
ORIGINATOR		*PROVIDER*	
TT - Radiography and Clinical Technology			
QUALIFICATION TYPE	*FIELD*	*SUBFIELD*	
National First Degree	9 - Health Sciences and Social Services	Curative Health	
ABET BAND	*MINIMUM CREDITS*	*NQF LEVEL*	*QUAL CLASS*
Undefined	480	Level 7	Regular-ELOAC

New NQF Level: NQF Level 08

This qualification does not replace any other qualification and is not replaced by another qualification.

PURPOSE AND RATIONALE OF THE QUALIFICATION
Purpose:

This Qualification serves to ensure competent, innovative technologists who will enhance the efficacy of Radiation Oncology, thereby forming an essential part of the radiation oncology team which provides a holistic healthcare service in both the public and the private sectors.

This Qualification will enable the successful learner to competently apply theoretical knowledge, skills and practical experience in radiation laboratory procedures and assist with invasive brachytherapy techniques.

The role of the radiation laboratory technologist includes the preparation of patients prior to radiation therapy, viz., treatment localisation and planning, manufacturing of immobilisation and beam modifying aids, ensuring quality assurance of the radiation laboratory as an entity of the radiation oncology process, and participating in education as part of the radiation oncology team.

The learner will be able to competently apply an integration of theory, principles, proven techniques, practical experience and appropriate skills to the solution of well-defined and abstract problems in the selected field of Radiation Oncology working in the radiation laboratory. This will be achieved by meeting the following outcomes:

- Applying ethical and human rights principles and health and safety regulations in the pursuance of promoting and sustaining development of radiation treatment delivery.
- Applying specialised academic knowledge and technical skills to ensure optimum standards of patient treatment and care.
- Demonstrating appropriate skills in management and research allowing the holder of this Qualification to work independently and in a supervisory capacity within the health care team.

Learners who successfully complete this Qualification will be eligible for registration with the relevant Health Professional Council as an independent practitioner.

Rationale:

The technological advancements seen in Radiation Oncology radiation treatment planning and radiation treatment delivery (in the fields of both external beam radiation therapy (EBRT) and brachytherapy), demonstrate the need for innovative, sophisticated, individualised treatment and accessory construction in order to ensure that precision dose planning and treatment delivery is effective. The radiation laboratory plays a key supportive role in the interdisciplinary team in Radiation Oncology through promoting and sustaining the technological advances in this field. Radiation Laboratory Technology is dependent on interdisciplinary fields such as physics, human biology and computer sciences to extract that information.

The role of the radiation laboratory technologist is described by the National Department of Health as the manufacturing of immobilisation and shielding devices. These immobilisation devices are used to make sure that the patient is treated in exactly the same position each day. It is for this reason that, even though these professionals are trained in mechanical, dental and laboratory principles, their work with patients necessitates additional skills in radiation safety, patient care and ethics.

The Qualification and curriculum required for the practice of radiation laboratory technology has grown from informal, hospital-based training to a formal Qualification offered by selective Higher Education institutions in partnership with academic hospitals where Radiation Oncology services are offered.

RECOGNIZE PREVIOUS LEARNING?
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LEARNING ASSUMED IN PLACE
- Communication at NQF Level 4.
- Mathematics at NQF Level 4.
- Biology at NQF Level 4.
- Computer Literacy at NQF Level 3 is strongly recommended.

Recognition of Prior Learning:

This Qualification may be achieved in part through the recognition of relevant prior learning and/or through prior experience as a practitioner in another field such as radiotherapy or radiography.

Assessment may be based on certified portfolios of evidence submitted by the learner, as well as proven competence against any of the given Exit Level Outcomes. Recognition of Prior Learning will be applied on an individual basis and will be conducted in accordance with the institution's accredited Recognition of Prior Learning policy. Such procedures and the assessment of individual cases are subject to moderation by independent assessors.

This Qualification may be achieved in part through Recognition of Prior Learning, in accordance with the policies and procedures of the individual institutions and in agreement with the relevant ETQA, on presenting relevant evidence that meets the outcomes stated in the Qualification document.

Access to the Qualification:

Learners accessing this Qualification will be expected to be in possession of a National Senior Certificate with matriculation exemption, a relevant Further Education and Training Certificate or equivalent NQF Level 4 Qualification and comply with the selection policy of the relevant provider in agreement with the relevant ETQA.

QUALIFICATION RULES

• All Exit Level Outcomes must be achieved for the learner to be awarded the Qualification.
• This Qualification is competency based. In order to achieve clinical competency, notional hours will include theoretical and clinical components obtained at an accredited institution.
• The selection of Elective subjects offered to learners is at the discretion of the provider.

EXIT LEVEL OUTCOMES

1. Perform laboratory techniques appropriate to the clinical presentation or request and produce immobilisation and positioning devices for external beam radiotherapy and brachytherapy according to specified guidelines and patient treatment plans.

2. Select and assess the materials used for the production and manufacture of quality immobilisation, positioning and beam modifying devices according to specifications and patient treatment plans.

3. Evaluate request forms, radiographic and clinical notes to ensure that appropriate immobilisation devices are prepared in accordance with pattern recognition techniques and quality assurance.

4 Demonstrate responsible and effective patient care skills in terms of the principles of human rights and medical law.

5. Apply relevant, current legislation, ethical principles, guidelines and codes of practice in the performance of radiation laboratory technology to ensure personal and public safety.

6. Manage the radiation laboratory activities within the context of a radiation oncology department.

7. Apply specialised academic knowledge and technical skills pertaining to radiation laboratory services to ensure optimum standards of care.

8. Conduct research and foster a research climate in the radiation laboratory within the context of radiation oncology, through the use and application of information technology.

9. Apply the principles, specific knowledge, skills and values related to the chosen elective subject.

• Range of possible electives:
  ○ Introduction to specialised maxillo-facial, dental orthotics or similar technologies.
  ○ Clinical engineering in radiotherapy.
  ○ Educational training.
  ○ Diagnostic radiography.
  ○ Radiotherapy.
  ○ Advanced radiotherapy treatment techniques.
  ○ Nuclear medicine.
  ○ Small and medium business enterprises.

Critical Cross-Field Outcomes:

The Qualification promotes the Critical Cross-Field Outcomes in the following manner:

• Identifying and solving problems is demonstrated through the application of specialised academic knowledge and technical skills in terms of radiation laboratory technology.
• Working effectively with other members of the oncology team is demonstrated in the confident performance of professional duties.
• Organising and managing self is demonstrated in the provision of specialised moulds and other materials/tools to aid in the provision of successful oncological treatment of patients.

• Collating data is indicated in the selection and assessment of materials used to identify health problems in the context of radiation laboratory technology and implement a plan of action through the application of knowledge of anatomy, pathology, radiobiology and physics.
• Communicating effectively is demonstrated through the utilisation of effective procedures, techniques and resources available to ensure that the radiation laboratory technology department functions effectively.
• Utilising science and technology critically and effectively is demonstrated in the core work of the radiation laboratory technologist.
• Demonstrating and understanding the world of related systems is demonstrated through the capability to perform laboratory techniques appropriate to the clinical setting and produce quality immobilisation and positioning devices which meet the specific needs required.

ASSOCIATED ASSESSMENT CRITERIA
Associated Assessment Criteria for Exit-Level Outcomes 1:

1.1 Appropriate routine radiation laboratory techniques are performed with and without patients.
1.2 The selection of techniques is based on integrated, applied knowledge of anatomy, physiology, pathology, radiobiology, physics and radiation physics.
1.3 Patient is appropriately positioned and immobilised and the beam is modified accordingly.
1.4 Knowledge of aids required for the various treatment modalities used is demonstrated.
1.5 Devices are evaluated for quality, information recorded and documentation kept according to departmental standards.
1.6 Knowledge of laboratory tools and apparatus and dexterity in utilisation is demonstrated and applied.
1.7 Radiation protection and safety measures conforming to the ALARA (as low as reasonably achievable) principles are correctly applied to techniques involving sealed and unsealed radio-active materials.

Associated Assessment Criteria for Exit-Level Outcomes 2:

2.1 Integrated knowledge of applied anatomy, physiology, pathology, radiobiology and physics is applied in the selection of materials used for immobilisation and beam modification.
2.2 Occupational health and safety regulations are applied during the production of immobilisation and beam modifying devices.
2.3 The structure and properties of impressions, castings, thermoplastic and plaster materials are described and appropriately selected for a specific patient.
2.4 The physical and chemical conditions that affect dental waxes, polyurethanes, alginates, bases, catalysts, resins and metals are described and applied to the production of beam modifying devices.
2.5 The radiological properties of the materials used are identified and their selection justified.
2.6 Hazardous substances routinely used in the radiation laboratory are identified and the relevant safety measures taken to protect patients, staff and public are explained.

Associated Assessment Criteria for Exit-Level Outcomes 3:

3.1 The Radiation Laboratory Technology request form is interrogated to ensure that appropriate devices are made.
3.2 A patient is assessed against the clinical request form and appropriate measurements are interpreted and applied.
3.3 Beam modifying and patient immobilisation devices are evaluated to ensure compliance with quality standards.
3.4 Devices are developed that conform to standards of practice and medico-legal requirements.
3.5 Normal and abnormal devices are recognised and differentiated where applicable.

Associated Assessment Criteria for Exit-Level Outcomes 4:

4.1 Patient is assessed relevant to presenting clinical condition and appropriate care is given.
4.2 Verbal and non-verbal communication skills are used in dealing with diversity in patients.
• Range of diversity includes but is not limited to: Race, culture, religion, ethnicity, language, sexual orientation, political orientation, age, differential abilities, social-economic status.
4.3 Patient preparation procedures are carefully explained to the patient and patient understanding is ensured by eliciting patient response.
4.4 Medical emergencies are dealt with by applying appropriate First Aid measures and sending for professional assistance, if necessary.
4.5 Patients with special needs are catered for in a manner that advocates human dignity.

Associated Assessment Criteria for Exit-Level Outcomes 5:

5.1 Occupational health, safety and radiation control regulations are explained and applied during all activities within the radiation technology milieu.
5.2 Sectional rules and standing instructions are explained and applied at all times within the radiation laboratory and its surrounds.
5.3 The principles of ethics in clinical practice and governance are explained and practically applied in all interactions with colleagues, patients and other clients.
5.4 The principles of the Human Rights Bill and the Patient Charter are explained and applied.
5.5 Infection control measures are explained and stringently applied within the radiation oncology laboratory and clinical environments.

Associated Assessment Criteria for Exit-Level Outcomes 6:

6.1 Management principles and procedures are conducted and implemented to ensure effective integration within the radiation laboratory.
6.2 Management skills within the multidisciplinary team are applied to ensure effective and optimal patient treatment and flow.
6.3 Appropriate information technology is used to record, retrieve and communicate patient data.
6.4 Departmental policies and standard operating procedures are interrogated, implemented and adhered to for effective management of the radiotherapy laboratory.

Associated Assessment Criteria for Exit-Level Outcomes 7:

7.1 Principles, concepts, applications and procedures of maxillo-facial and other complementary healthcare technologies are explained and applied in the development of appropriate immobilisation devices.
7.2. Specialised knowledge and skills are applied in the development and improvement of radiation laboratory technology procedures.
7.3 The role of diagnostic imaging procedures are explained and integrated in radiation laboratory technology.
7.4 Specialised immobilisation aids are produced to match different categories of patients and their clinical conditions.
7.5 The relevance of new and specialised developments in treatment of oncology patients is explained in terms of their use and relevance in a radiation laboratory.

Associated Assessment Criteria for Exit-Level Outcomes 8:

8.1 An ongoing knowledge of appropriate information technology is maintained to keep abreast of continuing and new developments within the radiotherapy laboratory technology field.
8.2 Research needs within the field of radiotherapy laboratory technology are identified and an appropriate area for research is selected.
8.3 Quantitative and qualitative research methods are explained and discussed as possible solutions to own research needs.

8.4 A professional research proposal within the field of radiotherapy laboratory technology is developed, motivated and presented.
8.5 Research principles and methodology in the field of radiotherapy research are applied in order to complete a mini research project.
8.6 Research is conducted ethically according to established research methodology and practice.
8.7 Research findings and conclusions are prepared and presented in a research report according to the required research practice.

Associated Assessment Criteria for Exit-Level Outcomes 9:

9.1 Apply and integrate the principles and/or philosophy of the subject into related activities.
9.2 Apply specialised techniques required to achieve the contextual objective.
9.3 Apply quality assurance principles to ensure optimal results within the context of the subject.

Integrated Assessment:

Integrated assessment strategies are applied throughout the course of learning for this Qualification, in both formative and summative assessments.

Integrated assessment takes the form of a variety of appropriate assessment methods, which include:

- Written assignments.
- Practical assessments.
- Literature reviews.
- Field reports and/or workbooks.
- Informal tests.
- Case studies.
- Class presentations.
- Peer evaluation.
- Simulations in structured learning environments.

Formative Assessment:

- Learning and assessment are integrated.
- The scheme of work includes tests and assignments, practical work and competency evaluation of practical skills.
- The process is continuous and focuses on smaller sections of the work in limited number of outcomes.

Summative Assessment:

- Summative assessments evaluate the learners' abilities to manage and integrate larger bodies of knowledge and to achieve the stated outcomes.
- Summative assessments also focus on the learners' ability to integrate knowledge and skills in the particular area of specialisation.
- Summative assessments include theoretical and practical assessments.

INTERNATIONAL COMPARABILITY

The primary objective of designing this Qualification was to meet the needs of the South African community as identified by the National Department of Health and also to be comparable with international best practice. In trying to compare this Qualification with those internationally, it was noted that most of the institutions which offer education and training that is similar to radiation laboratory technology refer to these practitioners as mould room technologists or technicians.

Canada:

The British Columbia Institute of Technology (BCIT) offers a four year Radiation Therapy course and a three year full-time diploma for Tool and Die Technicians. Both courses have some aspects of mould making incorporated in the programme. For both these courses, learners are introduced to the environment which also provides familiarity with treatment planning terminology, patient contouring and immobilisation, and treatment field blocking methods, as well as simulator and CT simulator technology requires construction of a customised immobilisation device using accepted procedure.

The Tool and Die Technician programme offered by the BCIT has been designed to provide learners with tool making and plastic mould-making skills. It includes on the job training to support institutional instruction. The course as a whole is made of three parts, namely: Machinist Core programme, Co-opted work term in industry and the last part focuses on Tool and Die Specialisation which is devoted to the design and making of jigs and fixtures, the making of forming dies and punches, and the designing and building of plastic moulds.

The Canadian Association of Medical Radiation Technologists has included as module C of the competency profile for the radiation therapists, the ability to construct and fit an immobilisation devices to ensure patient comfort during radiation therapy procedures.

United Kingdom:

The training programme in the United Kingdom is very similar to the British Colombian one. Both have some training in the mould room in the radiation therapy scope. According to the Society of Radiographers in the United Kingdom, Mould Room Technologists are radiographers who plan treatment and prepare immobilisation devices for patients. The contents, skills required and job opportunities are also available to radiographers. The same principle is applied to radiographers who are offered extensive education and training in dosimetry. There is no formal course for dosimetry and mould room technicians.

The United Kingdom is developing a Voluntary Register of Clinical Technologists and has drafted a Scope of Practice. Generically clinical technologists are considered as healthcare scientists who "perform invasive procedures on patients or make clinical interventions or exercise judgement that can substantially impact on patient health or welfare". The practice is divided into Clinical Physics and Clinical Engineering. Under Clinical Physics the discipline of Radiation Physics is practised by the Radiation Physics Technologists, who perform specialised tasks in mould room, dose planning, virtual simulation, brachytherapy, quality control of radiotherapy systems and dose measurements. The mould room tasks include:

- Taking appropriate impressions of patients.
- Manufacturing custom made beam direction, modifying and shielding devices.
- Monitoring and reacting to changing needs of patients in the mould room or undergoing brachytherapy.
- Providing advice and point of contact for patients throughout the mould room process.
- Operating a broad range of mould room equipment including vacuum forming and computerised block cutting equipment.
- Managing and controlling mould room stocks.

United States of America:

The United States of America includes mould room training in the scope of the Radiation Therapist. However the construction and preparation of the immobilisation and beam directional/modification devices is performed under the supervision and recommendation of a

Medical Dosimetrist. Although both disciplines have contact with patients, neither is equivalent to radiotherapy or radiation laboratory technology in the South African context.

Malaysia:

At the Sains University Hospital in Malaysia, a mould room technologist makes a personalised mould to fix to that specific part of body bearing the tumour. The mould room technologist works in a workshop and uses a variety of equipment to design individualised moulds and treatment aids. This means that they do not have contact with patients. Training is offered by the Sains University as part of the Radiation Therapy programme.

India:

The course for the Radiology Technician (Radio Diagnosis and Radiotherapy) was designed in 2005 to meet the needs of the society in India for diagnostic radiography and radiation therapy. The course is offered under the Craftsmanship Training Scheme over a period of two years. Major sections of the course focus on diagnostic radiography and radiation therapy. Mould room technology is only offered close to the end of the training programme. Radiotherapy is offered during weeks 91 to 100 and mould room education forms only part of radio-therapeutic practices which cover the very last part of the course.

To be accepted into the radiology technician course, the learner must have passed 12th Class examinations with Physics, Chemistry and Biology. These entrance requirements compare fairly with those proposed for this Qualification. The South African requirement which is different from that in India is the emphasis on radiotherapy physics. In India, this subject is taught at an elementary level and principles and practical applications are then emphasised throughout.

Conclusion:

In comparing the courses that incorporate education and training of mould room technicians in other parts of the world, it is clear that not all countries have registration requirements for those people working in positions similar to the South African radiation laboratory technologists. Where there are no registration requirements, the safety of the patients is ensured through the fact that professionals with direct patient contact are already registered with other relevant health councils.

It is evident that this Qualification contains additional and more advanced learning than its international counterparts, because the Radiation Laboratory Technologist in South Africa is required to perform a greater variety of competencies and assume more hands-on treatment responsibilities. This Qualification compares favourably with similar qualifications in other countries, is likely to be classified as the best in developing countries and is among the best in the developed world.

ARTICULATION OPTIONS
This Qualification articulates:

- Horizontally with the Bachelor of Radiation Therapy.
- Vertically with a Masters degree in Radiation Laboratory Technology or any other Master in the field of Radiography or Radiation.

MODERATION OPTIONS
- Providers offering learning towards this qualification must be accredited by the relevant ETQA, in agreement with the relevant Health Professional Council.

- Moderation of assessment will be overseen by the appropriate ETQA according to moderation principles and procedures.

CRITERIA FOR THE REGISTRATION OF ASSESSORS

- Assessors must be registered in terms of the requirements of the relevant ETQA.
- Assessors and moderators must be used in a manner that fits into the quality management system of the provider and in accordance with the institutional tuition and assessment policies. This must also apply to the appointment of outside assessors and/or moderators.
- Assessors and moderators are expected to be in possession of a relevant Qualification above the NQF Level of this Qualification, as well as relevant clinical expertise and current experience. Such Qualifications include: National Diploma or Bachelor of Technology, M. Tech, D. Tech/PhD degree in Radiation Laboratory Technology or Radiation Therapy, Bachelor in Radiography: Radiotherapy, Bachelor Radiography (Hons), M. Radiography and PhD Radiography.

NOTES

Registration with the relevant Health Professional Council as a Learner is a statutory requirement when learners engage in providing services to individuals, groups and/or communities.

Following completion of this Qualification, the successful learner may be expected to complete a period of community service in terms of current legislative requirements before full registration as a professional with the relevant Health Professional Council can be obtained.

UNIT STANDARDS

This qualification is not based on Unit Standards.

LEARNING PROGRAMMES RECORDED AGAINST THIS QUALIFICATION

None