



Bachelor of Radiation Therapy (BRT)

Curriculum Document

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1. Graduate Profile

1.1 Description

The Bachelor of Radiation Therapy graduates are competent and flexible radiation therapists who possess effective and empathetic communication skills, combined with an inquiring nature conducive to lifelong learning in a technology driven environment. Graduates will have a sound theoretical understanding of radiation therapy and demonstrate safe and professional practice.

1.2 Graduate Attributes

- **GLOBAL PERSPECTIVE:** Appreciation of international perspectives in the radiation therapy and wider healthcare professions and the nature of global citizenship
- **INTERDISCIPLINARY PERSPECTIVE:** Commitment to intellectual openness and curiosity, and the awareness of the limits of current knowledge and the links amongst health disciplines
- **LIFELONG LEARNING:** Commitment to the on-going acquisition of new knowledge and new skills, and an ability to apply these to a constantly changing, technology driven environment, to reflect and review own practice and be responsive to the need for professional development
- **SCHOLARSHIP:** Commitment to the fundamental importance of the acquisition and development of knowledge and understanding
- **COMMUNICATION:** Ability to communicate information, arguments and analyses effectively, both orally and in writing
- **INTERPERSONAL SKILLS:** Ability to communicate appropriately with staff, patients and families, recognising the need for empathy and sensitivity
- **CRITICAL THINKING:** Ability to analyse radiation therapy and healthcare issues logically, to challenge conventional assumptions, to consider different options and viewpoints, make informed decisions and act with flexibility, adaptability and creativity
- **CULTURAL UNDERSTANDING:** Knowledge and appreciation of biculturalism within the framework of the Treaty of Waitangi; knowledge and appreciation of multiculturalism; and an ability to apply such knowledge in a culturally appropriate manner
- **ETHICS:** Knowledge of ethics and the application of ethical standards within the workplace and community
- **ENVIRONMENTAL LITERACY:** Basic understanding of the principles that govern radiation therapy and healthcare systems, the effects of human activity on these systems, and the cultures and economies that interact with those systems

- **INFORMATION LITERACY:** Ability to apply specific skills in acquiring, organising, analysing, evaluating and presenting information, in particular recognising the increasing prominence of digital-based activity to remain up to date with ever changing radiation therapy practice
- **RESEARCH:** Understanding of the principles of qualitative and quantitative methods, to report on this in an appropriate form by recognising when information is needed, and locating, retrieving, evaluating and using it effectively
- **SELF-MOTIVATION:** Capacity for self-directed activity and the ability to work independently
- **TEAMWORK:** Ability to work effectively as both a team leader and a team member within radiation therapy teams and the wider healthcare team

2. Occupational Conditions

During the programme, students must undertake approved work experience hours.

- The Work Experience hours complement the formal academic clinical components of the Bachelor of Radiation Therapy i.e. Radiation Therapy Practice I, Radiation Therapy Practice II and Radiation Therapy Practice III, and fully prepares students for clinical practice upon qualifying.
- Work Experience hours must be completed as per the Bachelor of Radiation Therapy academic calendar.
- Students will have completed approximately 2200 clinical hours (clinical studies plus work experience) at the completion of the degree.

3. Programme Development

3.1 Relocation to the University of Otago

With the dis-establishment of Central Institute of Technology (CIT) in June 2001, the Bachelor of Health Science (Radiation Therapy) relocated to the University of Otago's Wellington School of Medicine and Health Science. The programme was renamed the Bachelor of Health Sciences (Medical Radiation Therapy). Effective 1st January 2011 the programme was then renamed the Bachelor of Radiation Therapy to clarify the focus of this vocational programme, and to raise the profile within the University of Otago.

The radiation therapy profession and the University of Otago have taken the opportunity to develop the programmes in a university environment. This gives opportunities for study and research at undergraduate and postgraduate levels in an internationally recognized university focused on health sciences.

3.2 Background

The Bachelor of Health Science (Radiation Therapy) programme was a development of the National Diploma in Medical Radiation Therapy – which developed from the CIT's Diploma in Therapeutic Radiography.

The radiation therapy profession had, for a number of years, considered that a degree level qualification should be available in New Zealand. In 1990 a survey of the profession was conducted in which 81% of the respondents favoured a degree as the standard qualification. The British profession had a degree in radiation therapy for many years as had Australia. The USA moved in this direction also. Canada had announced a requirement for a degree level qualification as a pre-requisite for registration by the year 2005. For New Zealand graduates to maintain parity with their overseas counterparts they required a bachelor's level degree. Between 50 - 75% of New Zealand graduates in radiation therapy gain overseas experience in Australia and the United Kingdom.

A degree in Diagnostic Imaging was developed by Unitec and commenced in 1995. Manawatu Polytechnic (now UCOL) offers the Bachelor in Applied Science (Medical Imaging Technology), which commenced in 1996. A degree was also developed and implemented by CPIT (Christchurch Polytechnic Institute of Technology, now ARA Institute of Canterbury) in 1998. For radiation therapy, the implementation of the Bachelor of Health Science (Radiation Therapy) at CIT (Central Institute of Technology) allowed radiation therapists to maintain parity with their professional colleagues in New Zealand.

The therapy degree was developed in consultation with the radiation therapy profession. A sub-committee of the Radiation Therapy Advisory Committee was formed which had the major responsibility for both the structure and content of the degree programme.

In 2005 a University of Otago led Curriculum Review commenced and the revised curriculum was implemented from 2009 onwards. This curriculum has been developed after extensive consultation with the profession, university, stakeholders and external reviewers. In 2015 Year 1 of the curriculum was revised further, to align with changing practice and technologies. This leads to Year 2 and 3 of the curriculum being reviewed in the near future.

4. Programme Description

The curriculum is designed so that papers are taught as part of an integrated and coherent structure, with a consistent overall process of learning and problem solving and a series of vertical and horizontal learning areas or strands.

4.1 The Three Year Programme

The Bachelor of Radiation Therapy comprises three Years. Generally each Year will be completed in one year's full time study.

All papers are compulsory.

4.2 Year I

Year I consists of the following papers:

Paper Code	Paper Title	Points
RADT121	Radiation Therapy Practice I	11
RADT122	Anatomy & Imaging	32
RADT123	Radiation Therapy and Oncology I	30
RADT124	Radiation Therapy Planning Concepts I	12
RADT125	Healthcare Communication	8
RADT126	Health & Human Behaviour	9
RADT127	Radiation Technology I	18

1 point is equivalent to 12.5 hours of student learning

4.3 Year II

Year II consists of the following papers:

Paper Code	Paper Title	Prerequisite	Points
RADT211	Radiation Therapy Practice II	All Year I papers	60
RADT212	Principles of Research	All Year I papers	6
RADT213	Advanced Healthcare Communication	RADT126 & RADT125	10
RADT214	Radiation Technology II	RADT127	16
RADT215	Radiation Therapy and Oncology II	RADT123	10
RADT216	Radiation Therapy Planning Concepts II	RADT123 & 124	18

1 point is equivalent to 12.5 hours of student learning

4.4 Year III

Year III consists of the following papers:

Paper Code	Paper Title	Prerequisite	Points
RADT311	Radiation Therapy Practice III	RADT312, 313, 314, 315	60
RADT312	Literature Analysis	RADT212	12
RADT313	Professional Development	RADT213	12
RADT314	Radiation Therapy and Oncology III	RADT215	14
RADT315	Radiation Therapy Planning Concepts III	RADT215 & RADT216	22

1 point is equivalent to 12.5 hours of student learning

4.5 **Integration of a Process Curriculum**

Vertical and horizontal integration of the programme is important to enable students to develop increasingly complex cognitive, affective and psychomotor skills. This integration has been achieved by the overall programme design which links paper content and learning outcomes within and across Years.

Integration will also be achieved by the extensive use of case studies, projects, problem solving exercises, seminars and through clinical situations. Sequencing will guide the student to obtain sufficient background information and level of skill to deal with progressively more complex material and situations.

Integration will require good communication among lecturers. To this end the Head of Department is responsible for regular and frequent communication between members of the teaching team.

4.6 **Learning, Interacting and Self-Management**

The way in which the student learns and interacts with others (staff, students, patients and other professionals) throughout the programme is considered to be the key to the achievement of the aims concerning personal growth. Students will be encouraged, from the outset, to develop the skills of an independent learner and to reflect upon their learning. The ability to self-assess is an integral part of the programme's objectives.

It is essential to facilitate the early adaptation of students to expectations regarding their role in the learning process and their ability to interact with others.

Exercises in independent learning and critical thinking are introduced at the start of the programme. Developing effective verbal and written communication skills is an important aim throughout the programme. There are papers which specifically address these areas, such as the Behavioural Science papers. However, there is also a formal expectation of early application of the principles in all courses in the first Year and beyond.

In all papers, students will be required to investigate topic areas to a greater depth than that provided during class contact hours. To this end, formal class contact will usually be no more than 20 hours per week.

4.7 **Accessing a Specific Academic Base**

Biological Sciences

Students will develop the ability to understand the basic systems of the human body and how these interact.

This is delivered through the anatomy and cancer cell biology concepts. The imaging of anatomy is introduced at the beginning of Year I and forms a foundation for the Radiation Therapy & Oncology and Radiation Therapy Planning Concepts papers.

4.8 Behavioural Science

Students need to have access to knowledge from behavioural science and healthcare communication to enable them to perform as competent professionals in the field of radiation therapy.

This knowledge is essential to enable graduates to understand the context of illness and work with clients, colleagues and others they may interact with while performing as a professional in the field. These skills will be integrated into the Radiation Therapy Practice and Healthcare Communication papers as well as the Health and Human Behaviour components.

4.9 Physics and Allied Sciences

Since most radiation treatment is provided using advanced technology students require a sound knowledge of physics as well as sufficient understanding of radiation technology to enable them to perform in a professional manner. Specialist lecturers will be employed to ensure that the latest information is presented to students. The papers relevant to this area are the Radiation Technology I & II.

4.10 Radiation Therapy Practice

This section of the curriculum, which includes Radiation Therapy Practice I, II and III, is designed to prepare the student for practice in a modern clinical setting. The clinical practice papers are designed to integrate the students' learning to a point where practical skills and theoretical understanding merge. Students have the opportunity to develop their clinical skills under supervision in well-equipped radiation oncology departments in Auckland, Waikato, Tauranga, Palmerston North, Wellington, Christchurch and Dunedin and, Australia (Gold Coast, Cairns and Sydney).

4.11 Research

As professionals in the field of radiation therapy, graduates must be able to critically analyse research published by others. To this end students will study the principles of good research methodologies. While these principles are covered in the Principles of Research and Literature Analysis papers the concepts will be carried through all the subjects of the final years of the programme.

5. Timing of the Programme

5.1 Duration of the Course

The Bachelor of Radiation Therapy is a three year full time programme.

5.2 Composition of Each Year

Year I

- 31 weeks attending classes at the Department of Radiation Therapy, University of Otago, Wellington;
- 2 weeks Radiation Therapy Practice with a clinical provider.

Year II

- 1 semester Radiation Therapy Practice with a clinical provider;
- 1 semester attending classes at the Department of Radiation Therapy, University of Otago, Wellington.

Year III

- 1 semester attending classes at the Department of Radiation Therapy, University of Otago, Wellington;
- 1 semester Radiation Therapy Practice with a clinical provider.

5.3 Completion of the Course

- Students will need a clinical placement before re-enrolling in a clinical paper.
- Students will be expected to complete the programme in five years or less.

6. Structure of the Programme

The programme consists of 4500 notional hours of student learning divided into three years.

6.1 Year I

RADT121	Radiation Therapy Practice I
RADT122	Anatomy & Imaging
RADT123	Radiation Therapy and Oncology I
RADT124	Radiation Therapy Planning Concepts I
RADT125	Healthcare Communication
RADT126	Health & Human Behaviour
RADT127	Radiation Technology I

6.2 Year II

RADT211	Radiation Therapy Practice II
RADT212	Principles of Research
RADT213	Advanced Healthcare Communication
RADT214	Radiation Technology II
RADT215	Radiation Therapy and Oncology II
RADT216	Radiation Therapy Planning Concepts II

6.3 Year III

RADT311	Radiation Therapy Practice III
RADT312	Literature Analysis
RADT313	Professional Development
RADT314	Radiation Therapy and Oncology III
RADT315	Radiation Therapy Planning Concepts III

7. Assessment

7.1 Assessment Philosophy

All assessment tasks will allow students to demonstrate their achievement of the learning outcomes being assessed.

This philosophy will be implemented by the use of the following strategies:

- All assessment tasks will be appropriate for the level and nature of the learning outcomes being assessed.
- Each assessment task will be clearly stated.
- Dates for assessments will be advised to students in advance. The dates for all summative assessments will be published at the beginning of each semester.
- Self and peer assessment will be encouraged and used whenever appropriate.
- Formative assessments will be carried out to identify difficulties students may be encountering, and to provide frequent feedback on learning progress.
- When it is appropriate for students work to be returned after marking, it will be returned as soon as practical.

7.2 Assessment Pattern

Students must have a current approved comprehensive first aid certificate before taking a final clinical or written assessment. This is relevant for Year I, II and III.

RADT121: Radiation Therapy Practice I

Summative assessment will consist of the following:

- assignment = 40% of total mark
- test = 20% of total mark
- practical assessment = 40% of total mark

A pass will be awarded to all students who gain 50% overall.

RADT122: Anatomy & Imaging

Summative assessment will consist of the following:

- test 1 = 20% of total mark
- test 2 = 20% of total mark
- test 3 (imaging) = 20% of total mark
- final 2 hour written examination = 40% of total mark

50% must be gained in the coursework to be eligible to sit the final examination.

A pass will be awarded to all students who gain 50% minimum in the examination and 50% overall.

RADT123: Radiation Therapy and Oncology I

Summative assessment will consist of the following:

- test 1 = 20% of total mark
- assignment (wiki) = 20% of total mark
- test 2 = 20% of total mark
- final 2 hour written examination = 40% of total mark

50% must be gained in the coursework to be eligible to take the final examination.

A pass will be awarded to all students who gain 50% minimum in the examination and 50% overall.

RADT124: Radiation Therapy Planning Concepts I

Summative assessment will consist of the following:

- assignment = 30% of total mark
- test (calculations) = 30% of total mark
- viva = 40% of total mark

A pass will be awarded to all students who gain 50% overall.

RADT125: Health Care Communication

Summative assessment will consist of the following:

- assignment = 50% of total mark
- observational analysis = 50% of total mark

Formative assessment will consist of participation in a communication skills workshop and submission of a written self-reflection assignment in order to meet coursework terms.

A pass will be awarded to all students who gain 50% overall in the coursework and participate in the communication skills workshop.

RADT126: Health & Human Behaviour

Summative assessment will consist of the following:

- E poster = 35% of total mark
- group presentation = 25% of total mark
- final 2 hour written examination = 40% of total mark

50% must be gained in the coursework to be eligible to sit the final examination.

A pass will be awarded to all students who gain 50% minimum in the examination and 50% overall.

RADT127: Radiation Technology I

Summative assessment will consist of the following:

- test 1 = 20% of total mark
- test 2 = 20% of total mark
- test 3 = 20% of total mark
- final 2 hour written examination = 40% of total mark

50% must be gained in the coursework to be eligible to take the final examination.

A pass will be awarded to all students who gain a minimum of 50% in the examination and 50% overall.

RADT211: Radiation Therapy Practice II

Summative assessment will consist of all outcomes within each domain:

- CT assessment = Pass/Fail
- Planning assessment = Pass/Fail
- Treatment assessment = Pass/Fail
- and
- one clinical journal = Pass/Fail

A pass will be awarded to all students who gain a pass in each domain.

Students will need to gain 640 clinical hours for the semester in which they have enrolled and have a valid first aid certificate.

Reassessment:

- Reassessment can occur in two domains for each enrolment of the paper.
- If a student fails all three domains they are not eligible for reassessment and fail the paper overall.
- Reassessment can occur for the clinical journal.

RADT212: Principles of Research

Summative assessment will consist of the following:

- quantitative assignment = 50% of total mark
- qualitative assignment = 50% of total mark

A pass will be awarded to all students who gain 50% overall.

RADT213: Advanced Healthcare Communication

Summative assessment will consist of the following:

- assignment 1 = 50% of total mark
- assignment 2 = 50% of total mark

Formative assessment will consist of participation in a communication skills workshop and submission of a written self-reflection assignment in order to meet coursework terms.

A pass will be awarded to all students who gain 50% overall and participate in the communication skills workshop.

RADT214: Radiation Technology II

Summative assessment will consist of the following:

- assignment = 30% of total mark
- test = 30% of total mark
- final 2 hour written examination = 40% of total mark

50% must be gained in the coursework to be eligible to take the final examination.

A pass will be awarded to all students who gain a minimum of 50% in the examination and 50% overall.

RADT215: Radiation Therapy and Oncology II

Summative assessment will consist of the following:

- test = 30% of total mark
- group presentation = 30% of total mark
- final 2 hour written examination = 40% of total mark

50% must be gained in the coursework to be eligible to take the final examination. A pass will be awarded to all students who gain 50% minimum in the examination and 50% overall.

RADT216: Radiation Therapy Planning Concepts II

Summative assessment will consist of the following:

- assignment = 30% of total mark
- radiobiology test = 20% of total mark
- viva* (60% pass mark) = 50% of total mark

*consists of plan generation and discussion

A pass will be awarded to all students who gain 50% minimum overall.

Reassessment

- one reassessment can occur if the pass mark of 60% is not achieved in the dosimetry viva;
- any student requiring a viva reassessment will only be able to gain a final minimum pass mark of 60%.

RADT311: Radiation Therapy Practice III

Summative assessment will consist of all outcomes within each domain:

- CT assessment = Pass/Fail
- Planning assessment = Pass/Fail
- Treatment assessment = Pass/Fail

A pass will be awarded to all students who gain a pass in each domain.

Students will need to gain 640 clinical hours for the semester in which they have enrolled and have a valid first aid certificate.

Reassessment:

- Reassessment can occur in two domains for each enrolment of the paper.
- If a student fails all three domains they are not eligible for reassessment and fail the paper overall.

RADT312: Literature Analysis

Summative assessment will consist of the following:

- journal club = 20% of total mark
- literature review = 40% of total mark
- poster discussion = 40% of total mark

A pass will be awarded to all students who gain 50% overall.

RADT313: Professional Development

Summative assessment will consist of the following:

- CPD assessment = 50% of total mark
- Part A – assignment (25%)
- Part B - presentations (25%)
- professional issues assignment = 50% of total mark

Formative assessment will consist of participation in a communication skills workshop and submission of a written self-reflection assignment; plus participation in the Interprofessional Education (IPE) component in order to meet coursework requirements (terms).

A pass will be awarded to all students who gain 50% overall and participate in the communication skills workshop.

RADT314: Radiation Therapy and Oncology III

Summative assessment will consist of the following:

- test = 30% of total mark
- assignment = 30% of total mark
- final 2 hour written examination = 40% of total mark

50% must be gained in the coursework to be eligible to take the final examination.

A pass will be awarded to all students who gain 50% minimum in the examination and 50% overall.

RADT315: Radiation Therapy Planning Concepts III

Summative assessment will consist of the following:

- assignment = 40% of total mark
- radiobiology test = 20% of total mark
- viva (67% pass mark) = 40% of total mark

A pass will be awarded to all students who gain 50% minimum overall.

Reassessment

- one reassessment can occur if the pass mark of 67% is not achieved in the dosimetry viva;
- any student requiring a viva reassessment will only be able to gain a final minimum pass mark of 67%.

7.3 Assessment Standards

The overall standards are laid out in the Graduate Profile as the attributes of the graduate of the programme (see page 1).

These aims have been developed in close association with the profession through the Curriculum Review Committee and the Radiation Therapy Board of Studies and Examinations.

7.4 Moderators

Internal moderation occurs for each paper within the Department of Radiation Therapy. One external moderator is appointed from the profession to moderate radiation therapy focussed written examinations. External specialists moderate other papers, e.g. *Health and Human Behaviour*. A clinical radiation therapist moderates a sampling of clinical journals (see section 10 for details).

7.5 Accreditation

The Medical Radiation Technologists Board accredits the Bachelor of Radiation Therapy in accordance with guidelines, under the Health Practitioners Competence Assurance Act, 2003.

8. Procedures for Changes to the Programme

There are three levels of change in the programme which can take place:

8.1 Minimal Changes

Small alterations to the programme will be implemented within the Department of Radiation Therapy.

8.2 Minor Changes

Where the changes are more significant, but do not involve the structure of the programme they will be referred on to the Radiation Therapy Board of Studies and Examinations. Minutes from these meetings refer issues to the Academic Board of the Division of Health Sciences.

8.3 Major Changes

Any change to the overall structure will be referred to CUAP for approval following approval by the University of Otago Senate.

9. Management of the Programme

9.1 Programme Co-ordination

The Director and Head of Department has responsibility for the overall co-ordination of the programme.

9.2 Paper Convenors

Paper Convenors are responsible for the efficient co-ordination and delivery of papers. The internal moderators work with the Paper Convenors on content and assessment.

9.3 Year Leaders

Year Leaders have an overall responsibility for the students in a particular Year of the course. Responsibilities include pastoral care, staff/student meetings and facilitating the Professional Attitudes process.

10. Moderation

10.1 External Moderators

10.1.1 Functions

- External moderators shall be responsible for providing an impartial evaluation of student assessment for degree programme papers.
- One external moderator will be appointed from the profession to moderate radiation therapy focused written examinations.
- External specialist lecturers moderate other papers.

More Specifically

The functions of the external moderators are to ensure that:

- the evaluation of students' performance was fair and impartial;
- the standard of achievement required of students is comparable with that required in other institutions offering degree qualifications.

10.1.2 Specific Responsibilities

- To report to the Radiation Therapy Board of Studies and Examinations Committee on the effectiveness of assessments and any conclusions drawn from them.
- To have authority to report directly to the Head of Department where there are concerns about standards of assessment and performance.
- To participate as required in any meeting of the Board of Studies and Examinations which relates to results recommended during the moderator's period of office.
- To concur with the form and content of summative assessments for the paper.
- To ensure that the assessments are conducted in accordance with programme regulations.

10.1.3 Appointment Criteria

To carry out their responsibilities, external moderators must be:

- competent in assessing student knowledge and skills at degree level;
- expert in the field of study concerned;
- impartial in judgement;
- properly briefed on their role and on the guiding principle and philosophy of the course.

10.1.4 Appointment Procedure

- The appointment of all external moderators must be approved by the Board of Studies and Examinations based on the recommendations of the Head of Department;
- External Moderators will normally be appointed for a term of three years;
- New moderators should take up their appointment on or before the retirement of their predecessors. Moderators should remain available after the last assessments with which they are to be associated in order to deal with any subsequent reviews of decisions.

10.2 **Internal Moderators**

10.2.1 **Functions**

- Internal moderators shall be responsible for peer review of student assessment for all degree programme papers.

10.2.2 **Specific Responsibilities**

- To concur with the form and content of summative assessments for the paper.
- To ensure that the assessments are conducted in accordance with the programme regulations.

11. Relationship to Other Programmes

11.1 Overseas Undergraduate Qualifications

A number of New Zealand radiation therapists have gained degree level qualifications in radiation therapy. The most popular programmes were the BHSc – Conversion Programme from the Central Institute of Technology and the BSc (Radiography) Conversion Programme from the Anglia Polytechnic University in England. These programmes and others such as the BSc(Hons) Radiotherapy from Southbank University, London, require students to attain high levels of competency, the skills of the reflective practitioner and the skills of critical analysis in relation to research. The outcomes of these qualifications are similar to those of the Bachelor of Radiation Therapy programme.

New Zealand graduates of the Bachelor of Radiation Therapy (or equivalent) are eligible to apply to work in several countries including the United Kingdom, Ireland, Canada, Australia and many Arab states.

11.2 New Zealand Postgraduate Qualifications

There are a number of postgraduate qualifications available to the graduates from the Bachelor of Radiation Therapy.

The University of Otago offers the Bachelor of Radiation Therapy (Honours), the Postgraduate Certificate in Health Sciences endorsed in Radiation Therapy Advanced Practice and also postgraduate certificates, diplomas, masters and PhD programmes.

12. Programme Regulations

12.1 Admission to the Programme

- a) Admission to the programme shall be determined by the Radiation Therapy Admissions Committee.
- b) Admission to the programme is limited to a number of applicants determined annually based on the number of clinical placements available.
- c) Applications for admission may be made under the following categories:
 - i. Secondary school
 - ii. One year of University study
 - iii. Two or more years of University study
 - iv. Graduate
 - v. Alternative

For further admissions regulations refer to University of Otago Calendar.

12.2 Structure of the Programme

- a) Every programme of study shall satisfy the requirements set out in the Schedule of papers for the degree and shall normally be pursued over three years of full-time study.
- b) Candidates will not normally be permitted to enrol in any papers of a year until all papers of the preceding year have been passed.
- c) Candidates require a clinical placement before enrolling in a clinical paper.

12.3 Duration of the Programme

Candidates will normally be required to complete the programme in five years or fewer.

12.4 Credits and Exemptions

The Radiation Therapy Board of Studies and Examinations may grant such credits and exemptions as it deems appropriate for work done previously by a candidate.

12.5 Examinations

- a) Every candidate must gain terms before being admitted to examinations.
- b) Candidates who fail to gain terms shall subsequently pursue a course of study approved by the Radiation Therapy Board of Studies and Examinations.
- c) A candidate who fails any paper may, on the recommendation of the Radiation Therapy Board of Studies and Examinations, be admitted to a special examination.

12.6 Withdrawal from the Programme

A candidate who withdraws from the course must obtain the approval of the Radiation Therapy Board of Studies and Examinations. Applications for readmission must be submitted to the Radiation Therapy Board of Studies and Examinations by 1 November in the year prior to that for which readmission is sought.

12.7 **Exclusion from the Programme**

- a) Any candidate who fails to complete the requirements for a paper in two academic years may be excluded by the Board of the Division of Health Sciences on the recommendation of the Radiation Therapy Board of Studies and Examinations.
- b) Any student who, during the course of their studies, is
 - i. subject to criminal charges;
 - ii. subject to disciplinary proceedings of the University or of a professional body; or
 - iii. found to have an issue (whether in connection with their mental or physical health, or their professional attributes or conduct, or otherwise) that compromises or is likely to compromise their fitness to practise; or
 - iv. found to have failed to declare a matter covered by (b)(i)-(iii), may be excluded from further study towards the degree by the Academic Board of the Division of Health Sciences on the recommendation of the Radiation Therapy Board of Studies and Examinations.

12.8 **Variations**

The Pro-Vice-Chancellor (Health Sciences) may in exceptional circumstances approve a course of study which does not comply with these regulations.

13. Minimum Coursework Requirements

13.1 Attendance

- a) Students are expected to attend all classes unless excused on medical or other acceptable grounds. If a student cannot attend class they must email reception on: rtenquiries.uow@otago.ac.nz PRIOR to the class.
- b) Information on attendance will be made available to the appropriate Clinical Provider.
- c) A medical certificate will be required from any student who is absent from class for more than two days, due to illness.

13.2 Professional Attitudes

Throughout the year you will be formatively assessed on Professional Attitudes. This information may be available to Clinical Providers and is an important part of the programme.

13.3 Request for Leave

- a) Whilst at the University of Otago, Wellington; all requests for leave from the programme are to be considered by the Head of Department (form to be completed in consultation with the Year Leader)
- b) Whilst on clinical placement, all requests for leave from the programme that are 2 days or less are to be considered by the Clinical Tutor. All requests for leave that are more than 2 days are to be considered in consultation with the university (form to be completed).

13.4 Assessments

- a) Students will be given a range of formative assessments throughout the year as a basis for determining progress.
- b) Students must complete all coursework requirements, which includes formative and summative assessments.
- c) Extensions to coursework assessments may be granted by Paper Convenors in consultation with the Year Leader (evidence may need to be provided).
- d) If coursework assessments are late:
 - form to be completed (based on exam special consideration form)
 - provide evidence if possible to support late submission
 - this is considered by the Paper Convenor in consultation with the Year Leader.

Outcomes

- reason for late submission is accepted
- reason for late submission is not accepted and a penalty to the assessment mark may be applied.

Head of Department to be informed of situations as appropriate

- e) In the case of illness at the time of a test, the student must email reception on: rtenquiries.uow@otago.ac.nz PRIOR to the start of a test. A medical certificate must be presented (dated the day of the test) to the Head of Department before an alternative test will be arranged. Failure to observe this procedure may result in the student being refused an opportunity to sit the test, and therefore receive a score of zero for it.

- f) Students who are refused terms will normally be required to repeat the paper as a whole, subject to approval by the Radiation Therapy Board of Studies and Examinations.

13.5 Examinations

- a) Terms is defined as at least a 50% pass in the coursework component, and have met all coursework requirements.
- b) Students will need to achieve at least 50% in the examination to be eligible to be awarded a Pass overall.
- c) There are no aegrotat passes, although students may be eligible to apply for special consideration for a deferred examination.
- d) Students must pass all papers in the programme to be awarded the Bachelor of Radiation Therapy degree by the University of Otago.

13.6 General

Any student who attempts to deceive or practice deceit, or obtain unfair advantage by their actions as a student may be subject to disciplinary action.

13.7 Support

The Radiation Therapy Department encourages students to seek support if they find they are having difficulty with their studies

Contact:

Year Leader or the Associate Dean- Student Affairs

Or

Disability Information and Support

for issues with disability, temporary or permanent impairments, injury or chronic illness

Phone: (03) 479 8235

Fax: (03) 479 5873

Email: dis.learningsupport@otago.ac.nz

Website: <http://www.otago.ac.nz/disabilities>

14. Academic Integrity

14.1 Academic integrity

Academic integrity means being honest in studying and assessments. It is the basis for ethical decision-making and behaviour in an academic context. Academic integrity is informed by the values of honesty, trust, responsibility, fairness, respect and courage. Students are expected to be aware of, and act in accordance with, the University's Academic Integrity Policy.

14.2 Academic Misconduct

Academic Misconduct, such as plagiarism or cheating, is a breach of Academic Integrity and is taken very seriously by the University. Types of misconduct include plagiarism, copying, unauthorised collaboration, taking unauthorised material into a test or exam, impersonation, and assisting someone else's misconduct. A more extensive list of the types of academic misconduct and associated processes and penalties is available in the University's Student Academic Misconduct Procedures.

It is the student's responsibility to be aware of and use acceptable academic practices when completing assessments.

Academic Integrity – A Brief Guide for Students:

www.otago.ac.nz/otago464801.pdf

Academic Integrity Policy:

www.otago.ac.nz/administration/policies/otago116838.html

Student Academic Misconduct Procedures:

www.otago.ac.nz/administration/policies/otago116850.html

Academic Integrity and Academic Misconduct Information for Students:

www.otago.ac.nz/study/academicintegrity

15. PAPER DESCRIPTORS

YEAR ONE PAPERS

RADT121	Radiation Therapy Practice I
RADT122	Anatomy & Imaging
RADT123	Radiation Therapy and Oncology I
RADT124	Radiation Therapy Planning Concepts I
RADT125	Healthcare Communication
RADT126	Health & Human Behaviour
RADT127	Radiation Technology I

RADT121 Radiation Therapy Practice I

Paper Code	RADT121
Date:	January 2018
Duration:	96 contact hours and 41.5 hours of independent learning
Points:	11
Aim:	To enable students to gain a basic understanding of radiation therapy practice and integrate academic learning in the first year of the programme.
Recommended Entry Level:	Entry to the programme

Learning outcomes

On completion of this paper the successful student will be able to:

1. demonstrate knowledge of medical and radiation therapy terminology;
2. demonstrate knowledge of surface and planar anatomy;
3. describe and discuss legal and ethical issues related to radiation therapy and patient care;
4. describe and discuss linear accelerator use;
5. demonstrate routine radiation therapy techniques;
6. describe core qualities and skills involved in establishing a healthcare professional-patient relationship in the radiation therapy setting;
7. describe the radiobiology of normal tissues and tumours.

Content:

Corresponding to learning outcome 1

- a) Medical terminology
- b) Radiation therapy terminology

Corresponding to learning outcome 2

- a) Body regions and planes
- b) Boundaries and contents of body cavities
- c) Clinical significance of surface land marks and planes of head, thorax, abdomen and extremities

Corresponding to learning outcome 3

- a) Code of Ethics
- b) Ethical issues and privacy
- c) Relevant legislation
- d) Informed consent
- e) Professional organisations/Registration Boards
- f) Introduction to the health system
- g) Use of clinical information
- h) Professionalism

Corresponding to learning outcome 4

- a) Linear accelerators
- b) Pendant use

Corresponding to learning outcome 5

- a) Immobilisation and positioning devices
- b) Electron cut outs

- c) Multi leaf collimators
- d) Bolus
- e) Routine radiation therapy techniques/set ups
- f) Infection control and manual handling

Corresponding to learning outcome 6

- a) Core qualities, attitudes and skills of a healthcare professional
 - Social and emotional intelligence
 - Empathy
 - Rapport
 - Respect
- b) Professional relationships in the health care setting: patients, their families and colleagues
 - Ethical practice
 - Trust
 - Control
 - Self-disclosure
 - Self-care and self-reflection

Corresponding to learning outcome 7

- a) General radiobiology (ionisation, free radicals, DNA damage and cell death)
- b) Radiobiology of normal tissues (pathology and kinetics)
- c) Radiobiology of tumours (5Rs, cell survival curves, linear quadratic model)
- d) Hyper- and hypofractionation (application to tissue alpha/beta ratio)

Suggested Learning and Teaching Approaches

The learning outcomes of this paper could be achieved by the following:

- clinical practice in Department;
- tutorials with an emphasis on group discussion;
- seminar, case study, project presentations, journal club, study days and conferences;
- accessing media: journals, texts, newspaper articles and television provide a rich source of material for discussion, exploration;
- utilising a variety of small scale investigative techniques, participation in audit and research culminating in evidence based practice.

Assessment of Learning Outcomes

- | | | |
|------------------------|---|-------------------|
| • assignment | = | 40% of total mark |
| • test | = | 20% of total mark |
| • practical assessment | = | 40% of total mark |

A pass will be awarded to all students who gain 50% overall.

Reporting Results to Students

Results will be reported to students as follows:

Coursework 100

Student result notices will carry grades from A to E.

Resource

Joiner, M. & van der Kogel, A. (2009) *Basic Clinical Radiobiology* (4th Edition). Hodder Arnold, London

RADT122 Anatomy and Imaging

Paper Code	RADT122
Date	January 2018
Duration	155 contact hours and 245 hours of independent learning
Points	32
Aim	To gain a basic understanding of the gross and sectional anatomy of the human body and to be able to identify body structures on radiographic images
Recommended Entry Level:	Entry to the programme

Learning outcomes

On completion of this paper the successful student will be able to:

1. describe the anatomical organisation of the human body in terms of cells, tissues and organs for each of the principal organ systems;
2. describe in detail the lymphatic drainage of structures affected by cancer;
3. use knowledge of gross body anatomy to identify body structures on X-rays, CT scans and MRI scans;
4. describe DNA synthesis and gene expression;
5. describe the cell cycle and cell cycle progression;
6. describe mutagenesis and carcinogenesis.

Content:

Corresponding to learning outcome 1

- a) Cell types, tissue types, organs and function of:
- Integumentary system
 - Skeletal system
 - Muscular system
 - Cardiovascular system
 - Lymphatic system
 - Respiratory system
 - Digestive system
 - Urinary system
 - Reproductive systems
 - Endocrine system
 - Nervous system

Corresponding to learning outcome 2

- b) Lymphatic drainage of structures in: head and neck, thorax, abdomen, pelvis and extremities

Corresponding to learning outcome 3

- a) Principles and diagnostic purpose of X-rays, CR scans, MRI scans;
b) Identification of structures on X-rays, CT scans and MRI scans.

Corresponding to learning outcome 4

- a) Basic biochemistry, including structure of DNA and RNA
b) Genetic code
c) Molecular dogma (DNA synthesis, transcription, translation)

Corresponding to learning outcome 5

- a) Cell cycle, check points and progression

Corresponding to learning outcome 6

- a) Mutagenesis, proto-oncogenes and tumour suppressor genes
- b) Carcinogenesis as a multi-step process
- c) Hallmarks of cancer

Suggested Learning and Teaching Approaches

The learning outcomes of this paper could be achieved by the following:

- Lectures
- Student centred tutorials
- The use of models, X-rays, CT scan and MRI scans

Assessment of Learning Outcomes

Summative assessment will consist of the following:

- test 1 = 20% of total mark
- test 2 = 20% of total mark
- test 3 (imaging) = 20% of total mark
- final 2 hour written examination = 40% of total mark

50% must be gained in the coursework to be eligible to sit the final examination.

A pass will be awarded to all students who gain 50% minimum in the examination and 50% overall.

Reporting Results to Students

Results will be reported to students as follows:

Coursework	60
Final examination	40
TOTAL	100

Student result notices will carry grades from A to E.

Resources

Bridge, P. & Tipper, D. J. (2017). *CT Anatomy for Radiotherapy*. (2nd ed.) Cumbria: M&K Publishing.

Tortora, G. J., & Nielsen, M. T. (2014). *Principles of Human Anatomy* (13th ed.). Wiley.

RADT123 Radiation Therapy and Oncology I

Paper Code	RADT123
Date	January 2018
Duration	140 hours contact and 235 hours independent learning
Points	30
Aim	To enable students to gain a basic understanding of oncology, and the treatment modalities available to treat malignant disease.
Recommended Entry Level	Entry to programme

Learning outcomes

On completion of this paper the successful student will be able to describe and discuss in some detail:

1. pathology of common tumours and the ways in which they are classified;
2. treatment modalities used to treat benign and malignant disease;
3. radiation therapy techniques used in the treatment of disease;
4. care a patient may require when receiving radiation therapy;
5. chemotherapy and immunotherapy for patients with malignant disease
6. pharmacological approach to patient care during radiation therapy;
7. clinical trials.

Content:

Corresponding to Learning Outcome 1

- a) Malignant tumours
- b) Benign tumours treated with radiation therapy
- c) Epidemiology
- d) Aetiology
- e) Classification systems

Corresponding to Learning Outcome 2

- a) Surgery
- b) Radiation therapy
- c) Chemotherapy (including hormone therapy)
- d) Other treatment modalities
- e) Principles underlying the choice of treatment

Corresponding to Learning Outcome 3

- a) Radical intent
- b) Palliative intent
- c) Pre and post-operative techniques
- d) Adjuvant techniques

Corresponding to Learning Outcome 4

- a) Local reactions to radiation therapy
- b) Systemic reactions to radiation therapy
- c) Blood counts
- d) Diet and fluid intake
- e) Patient information
- f) Manual handling

- g) Infection control
- h) Specific patient needs, ie. catheter/colostomy, bedpan

Corresponding to Learning Outcome 5

- a) Principles of chemotherapy for cancer
- b) Cytotoxic chemotherapy
- c) Targeted chemotherapy
- d) Hormone therapy
- e) Immunotherapy
- f) Side effects of chemotherapy

Corresponding to Learning Outcome 6

- a) Pharmacological principles
- b) Adverse reactions to drugs
- c) Medications used for radiation therapy reactions
- d) Management of side effects including chemotherapy

Corresponding to Learning Outcome 7

- a) Phase I, I, III, IV clinical trials
- b) Clinical trial groups in radiation therapy (e.g. TROG)
- c) Publications

Suggested Learning and Teaching Approaches

The learning outcomes of this paper could be achieved by the following:

- student centred tutorials with an emphasis on class discussion and debate;
- the use of media such as videos, journals, texts, newspaper articles and television will provide a rich source of material for discussion, and exploration;
- one two-week visit to a radiation therapy department

Assessment of Learning Outcomes

Summative assessment will consist of the following:

- test 1 = 20% of total mark
- assignment (wiki) = 20% of total mark
- test 2 = 20% of total mark
- final 2 hour written examination = 40% of total mark

50% must be gained in the coursework to be eligible to take the final examination.

A pass will be awarded to all students who gain 50% minimum in the examination and 50% overall.

Reporting Results to Students

Results will be reported to students as follows:

Coursework	60
Final examination	40
TOTAL	100

Student result notices will carry grades from A to E.

Required textbook

Washington, C.M. & Leaver, D.T. (2010). Principles and Practice of Radiation Therapy. (4th Edition). Mosby, St Louis, Missouri.

Resources

Bomford, C., Kunkler, I., & Sherriff, S. (2003). *Walter & Miller's Textbook of Radiotherapy*. (6th Edition). Churchill Livingstone.

Bryant, B., & Knights K. (2007). *Pharmacology for Health Professionals* (2nd Edition). Mosby Elsevier, Sydney

Faithfull, S., & Wells, M. (2003). *Supportive Care in Radiotherapy* Churchill Livingstone, Edinburgh

Hass, M.L., Hogle, W.P., Moore-Higgs, G.J. & Gosselin-Acomb, T.K. (2007). *Radiation Therapy: A guide to patient care*. Mosby Elsevier, St Louis.

International Commission on Radiation Units and Measurements: (1993) *Prescribing, Recording, and Reporting Photon Beam Therapy*. (ICRU Report 50)

International Commission on Radiation Units and Measurements: (1999) *Prescribing, Recording, and Reporting Photon Beam Therapy*. Supplement to ICRU 50 (ICRU Report 62).

Joiner, M. & van der Kogel, A. (2009) *Basic Clinical Radiobiology* (4th Edition). Hodder Arnold, London

Moller, T.B. & Reif, E. (2006). *Pocket Atlas of Sectional Anatomy, CT and MRI, Vol 1 & Vol 2*. (3rd Edition). Thieme, New York.

Springhouse. (2008). *Clinical pharmacology made incredibly easy* (3rd edition). Lippincott, Williams and Wilkins, USA

RADT124 Radiation Therapy Planning Concepts I

Paper Code	RADT124
Date	July 2018
Duration	56 hours contact and 94 hours independent learning
Points	12
Aim	To enable students to gain a basic understanding of planning the treatment of malignant disease
Recommended Entry Level	Entry to programme

Learning outcomes

On completion of this paper the successful student will be able to demonstrate:

1. knowledge of basic calculations used in radiation therapy;
2. an understanding of manual planning principles;
3. knowledge and performance of basic principles and concepts of computer planning.

Content:

Corresponding to Learning Outcome 1

- a) Calibration conditions
- b) Inverse square law
- c) Attenuation factors for SSD and SAD techniques
- d) Manual calculations of basic radiation therapy SSD and SAD treatment techniques

Corresponding to Learning Outcome 2

- a) Isodose distributions
- b) ICRU 50/62
- c) Normalisation
- d) Weighting
- e) Beam energy, d-max, exit dose and arrangement
- f) Organs at risk

Corresponding to Learning Outcome 3

- a) Isodose distributions
- b) Computer planning principles
- c) ICRU 50/62
- d) Normalisation
- e) Weighting
- f) Beam energy, d-max, exit dose and arrangement
- g) Inhomogeneities
- h) Wedges
- i) Monitor Units
- j) Field verification
- k) Organs at risk

Suggested Learning and Teaching Approaches

The learning outcomes of this paper could be achieved by the following:

- practical laboratory tutorials for computer planning
- student centred tutorials with an emphasis on class discussion and debate
- the use of media such as videos, journals, and texts, will provide a rich source of material for discussion, and exploration.

Assessment of Learning Outcomes

Summative assessment will consist of the following:

- assignment = 30% of total mark
- test (calculations) = 30% of total mark
- viva = 40% of total mark

A pass will be awarded to all students who gain 50% overall.

Reporting Results to Students

Results will be reported to students as follows:

Coursework 100

Student result notices will carry grades from A to E.

Resources

Eclipse™ Treatment Planning System

Ball, J., & Moore, A. (1997) *Essential Physics for Radiographers*. Blackwell Scientific.

Barrett, A., Dobbs, J., Morris, S., & Roques, T. (2009). *Practical Radiotherapy Planning*. (4th Edition). London: Hodder education

Bomford, C.K. & Kunkler, I.H. (2003) *Walter and Miller's Textbook of radiotherapy : radiation, physics, therapy and oncology*. (6th ed.) Edinburgh, Churchill Livingstone.

Bridge, P. & Tipper, D. J. (2017). *CT Anatomy for Radiotherapy*. (2nd ed.)Cumbria: M&K Publishing.

Bushberg, J. T. (2002) *The essential physics of medical imaging*. Philadelphia, Pa.; London : Lippincott Williams & Wilkins.

Giancoli, D.C. (2005). *Physics - Principles with Applications*. (6th Edition). Prentice Hall, USA.

Coia, L., & Moycan, D. (1989). *Introduction to Clinical Radiation Oncology. Medical Physics Publishing Co-Op, Madison*.

Greene, D & Williams, P. (1997) *Linear accelerators for radiation therapy* Institute of Physics Publishing

Hass, M.L., Hogle, W.P., Moore-Higgs, G.J. & Gosselin-Acomb, T.K. (2007). *Radiation Therapy: A guide to patient care*. Mosby Elsevier, St Louis.

Hendee, W. & Ritenour R. (2002). *Medical imaging physics*. New York ; Chichester : Wiley-Liss,

International Commission on Radiation Units and Measurements: (1993) Prescribing, Recording, and Reporting Photon Beam Therapy. (ICRU Report 50)

International Commission on Radiation Units and Measurements: (1999) Prescribing, Recording, and Reporting Photon Beam Therapy. Supplement to ICRU 50 (ICRU Report 62).

International Commission on Radiation Units and Measurements: (2010) Prescribing, Recording, and Reporting Photon Beam Intensity-Modulated Radiation Therapy (IMRT) (ICRU Report 83)

Khan, F. (2003). *The Physics of Radiation Therapy*. (3rd Edition). Williams and Wilkins, Baltimore.

Moller, T.B. & Reif, E. (2006). *Pocket Atlas of Sectional Anatomy, CT and MRI, Vol 1 & Vol 2*. (3rd Edition). Thieme, New York.

Morris, S. (2001). *Radiotherapy physics and equipment*. Churchill Livingstone.

Purdy, J A. (2001) *3-D conformal and intensity modulated radiation therapy : physics & clinical applications*. Madison, WI, U.S.A. Advanced Medical Pub.

Washington, C.M. & Leaver, D.T. (2016). *Principles and Practice of Radiation Therapy*. (4th Edition). Mosby, St Louis, Missouri.

RADT125 Healthcare Communication

Paper Code	RADT125
Date	July 2018
Duration	40 contact hours and 60 hours of independent learning
Points	8
Aim	To introduce students to the foundations of healthcare communication skills and strategies and apply these to the radiation therapy setting.
Recommended Entry Level	Entry to programme

Learning outcomes

On completion of this paper the successful student will be able to:

1. demonstrate an understanding of core verbal and non-verbal communication skills in a range of contexts;
2. analyse different social, professional and personal value bases in the provision of healthcare;
3. identify the principles of culturally safe healthcare practice in the radiation therapy setting.

Content:

Corresponding to Learning Outcome 1

- a) Core verbal and nonverbal communication skills in health care relationships
 - multidimensional approach to listening
 - communication microskills: verbal and nonverbal
 - affirm, motivate, and educate others
- b) Cross cultural communication
- c) Communication contexts
 - Environmental
 - social and political
 - ethical
- d) Interviewing skills
- e) Communication within healthcare teams
- f) Speaking to a group

Corresponding to Learning Outcome 2

- a) Personal values and moral development
- b) Professional values in health care
- c) Social values in health care

Corresponding to Learning Outcome 3

- a) Cultural diversity, cultural safety and cultural competence
- b) Social and personal attitudes towards diversity and equality
 - prejudice, stereotyping, discrimination and stigma
- c) Professional culturally safe practice in New Zealand

Suggested Learning and Teaching Approaches

The learning outcomes of this paper could be achieved by the following:

- student centred tutorials with an emphasis on class discussion and debate;
- guest speakers who are able to offer current and practical information on topics;
- case studies and problem based learning;

- simulated clinical scenarios with the lecturer, actors and others modelling and coaching appropriate behaviours;
- the use of media such as videos, journals, texts, newspaper articles and television will provide a rich source of material for discussion, exploration and debate;
- use of a variety of small scale investigative techniques;
- the teaching material should draw on the student's personal and professional experiences and encourage critical inquiry and examination of the "taken for granted world".

Assessment of Learning Outcomes

Summative assessment will consist of the following:

- assignment = 50% of total mark
- group presentation = 50% of total mark

Formative assessment will consist of participation in a communication skills workshop and submission of a written self-reflection assignment in order to meet coursework terms. A pass will be awarded to all students who gain 50% overall in the coursework and participate in the communication skills workshop.

Reporting Results to Students

Results will be reported to students as follows:

Coursework	100
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Student result notices will carry grades from A to E.

Resource

O'Toole, G. (2016). *Communication: Core interpersonal skills for health professionals*. (3rd Ed.). Marrickville: Elsevier.

RADT126 Health and Human Behaviour

Paper Code	RADT126
Date	January 2018
Duration	45 contact hours and 67.5 hours of independent learning
Points	9
Aim	To introduce students to the psychological and sociological models of thinking about health, illness and coping with life-threatening illness and to apply this knowledge to the radiation therapy setting.
Recommended Entry Level	Entry to programme

Learning outcomes

On completion of this paper the successful student will be able to:

1. demonstrate an understanding of the relationship between health, well-being and human behaviour;
2. identify social, political, economic and cultural determinants of health;
3. discuss stress and coping in relation to diagnosis of and treatment(s) for life-threatening illness, with special emphasis on cancer;
4. discuss risk and protective factors across the lifespan that affect coping with life-threatening illness;
5. discuss the relevance of culture to an individual's and group's experience of society with particular reference to health and illness;
6. describe the relevance of the Treaty of Waitangi to New Zealand society and the delivery of health care;
7. discuss decision-making in relation to diagnosis, side-effects and survivorship of cancer and its treatment(s);
8. identify research methodologies in health psychology and health sociology.

Content:

Corresponding to Learning Outcome 1

- a) Definitions of health, well-being, illness and disease
- b) Health beliefs and health behaviour
- c) Theoretical perspectives of personality, learning and social learning, motivation and perception

Corresponding to Learning Outcome 2

- a) Systems of inequality based on class, age, gender, race, ethnicity, disability, sexual orientation;
- Prejudice, stereotyping, discrimination and stigma
- b) Inequalities in New Zealand society
- c) The consequences of inequalities in access to resources, including health for the individual, family and society, with an emphasis on cancer

Corresponding to Learning Outcome 3

- a) Causes and effects of stress on individuals
- b) Stress and the immune system
- c) Reactions to illness: interactions between physical, mental, emotional and social phenomena
- d) Coping strategies in relation to stress and illness

Corresponding to Learning Outcome 4

- a) Psychosocial modifiers of stress and coping across the lifespan
- b) Contextual influences on risk and protective factors that affect coping
- c) Human development and health

Corresponding to Learning Outcome 5

- a) The meaning and relevance of culture to individual and group self-perception, beliefs and practices
- b) The relevance of culture to New Zealand society
- c) Culture, health, illness, and health care delivery in the radiation therapy setting
- d) Cultural safety in health care delivery

Corresponding to Learning Outcome 6

- a) The Treaty of Waitangi and its significance to Maori and Pakeha
- b) The relevance and application of the Treaty of Waitangi to health, illness and health care delivery

Corresponding to Learning Outcome 7

- a) Cognition and health beliefs
- b) Clinical decision making
- c) Adherence to treatment, management of side-effects, survivorship/ living with life-threatening illness

Corresponding to Learning Outcome 8

- a) Quantitative research methodology in health psychology and sociology
- b) Qualitative research methodology in health psychology and sociology

Suggested Learning and Teaching Approaches

The learning outcomes of this paper could be achieved by the following:

- student centred tutorials with an emphasis on class discussion and debate;
- the use of research-based evidence;
- guest speakers who are able to offer current and practical information on topics;
- case studies and problem based learning;
- seminar and project presentations;
- the use of media such as videos, journals, texts, newspaper articles and television will provide a rich source of material for discussion, exploration and debate;
- use of a variety of small scale investigative techniques.

Assessment of Learning Outcomes

Summative assessment will consist of the following:

- | | | |
|------------------------------------|---|-------------------|
| • E poster | = | 35% of total mark |
| • group presentation | = | 25% of total mark |
| • final 2 hour written examination | = | 40% of total mark |

50% must be gained in the coursework to be eligible to sit the final examination.

A pass will be awarded to all students who gain 50% minimum in the examination and 50% overall.

Reporting Results to Students

Results will be reported to students as follows:

Coursework	60
Final examination	40
TOTAL	100

Student result notices will carry grades from A to E.

Resource

Barkway. P. (2014). *Psychology for Health Professionals*. (2nd Ed.). Sydney: Elsevier.

RADT127 Radiation Technology I

Paper Code	RADT127
Date	January 2018
Duration	90 contact hours and 135 hours of independent learning
Points	18
Aim	To introduce students to the basic principles of radiation physics, the application to radiation technology and the use of radiation therapy equipment.
Recommended Entry Level	Entry to the programme

Learning outcomes

On completion of this paper the successful student will be able to:

1. demonstrate an understanding of general physical principles in relation to radiation therapy;
2. discuss the basic physics of X and gamma radiation;
3. describe the principles of radiation protection and safety;
4. describe the principles of construction and operation of radiation therapy and imaging equipment;
5. describe the principles of diagnostic imaging technologies.

Content:

Corresponding to Learning Outcome 1

- a) Measurement units, uncertainties
- b) Systematic and random errors
- c) Properties of electromagnetic radiation
- d) Light sources (point sources, extended sources, lasers)
- e) Electric charge, fields, potential
- f) DC circuits and electrical measurements
- g) Alternating current and rectification

Corresponding to Learning Outcome 2

- a) Ionising radiation, exposure, dose
- b) Production of X-rays
- c) Radioactive decay and the production of gamma rays
- d) Interaction of radiation with matter, absorption processes
- e) Measurement of radiation

Corresponding to Learning Outcome 3

- a) Radiation protection principles
- b) Radiation safety legislation
- c) Personnel monitoring

Corresponding to Learning Outcome 4

- a) Kilovoltage X-ray units, power supplies and X-ray tubes
- b) Megavoltage X-ray units, linear accelerator technology

Corresponding to Learning Outcome 5

- a) Radiographic imaging, contrast agents
- b) Digital imaging, digital detectors
- c) CT

- d) MRI
- e) Nuclear medicine imaging including SPECT, PET
- f) Ultrasound

Suggested Learning and Teaching Approaches

The learning outcomes of this paper could be achieved by the following:

- lectures
- student centred tutorials
- laboratory demonstrations and practical sessions.

Assessment of Learning Outcomes

Summative assessment will consist of the following:

- test 1 = 20% of total mark
- test 2 = 20% of total mark
- test 3 = 20% of total mark
- final 2 hour written examination = 40% of total mark

50% must be gained in the coursework to be eligible to take the final examination.

A pass will be awarded to all students who gain a minimum of 50% in the examination and 50% overall.

Reporting Results to Students

Results will be reported to students as follows:

Coursework	60
Final examination	40
TOTAL	100

Student result notices will carry grades from A to E.

Required Textbook

Graham, D.T., Cloke, P. & Vosper, M. (2011). *Principles of Radiological Physics*. (6th Edition). Edinburgh, Churchill Livingstone.

Resources

Ball, J., & Moore, A. (1997) *Essential Physics for Radiographers*. Blackwell Scientific.

Bomford, C.K. & Kunkler, I.H. (2003) *Walter and Miller's Textbook of radiotherapy : radiation, physics, therapy and oncology*. (6th ed.) Edinburgh, Churchill Livingstone.

Bushong, S C. (2001) *Radiologic science for technologists : physics, biology, and protection*. St. Louis : Mosby.

Bushberg, J. T. (2002) *The essential physics of medical imaging*. Philadelphia, Pa.; London : Lippincott Williams & Wilkins.

Chesney, D., & Chesney, M. (1984). *Chesney's equipment for student radiographers*. Blackwell Scientific.

Giancoli, D.C. (2005). *Physics - Principles with Applications*. (6th Edition). Prentice Hall, USA.

Greene, D & Williams, P. (1997) *Linear accelerators for radiation therapy* Institute of Physics Publishing

Guy, G. & Ffytche, D. (2005) *An introduction to the principles of medical imaging*. London : Imperial College Press.

Hendee, W. & Ritenour R. (2002). *Medical imaging physics*. New York ; Chichester : Wiley-Liss

Hazle, J D. & others (1998) *Imaging in radiation therapy : American Association of Physicists in Medicine 1998 Summer School proceedings*, University of Wisconsin, Madison, Wisconsin.. Madison, WI : Published for the American Association of Physicists in Medicine by Medical Physics Pub.

Karzmark, C. J (1998) *A primer on theory and operation of linear accelerators in radiation therapy*. Madison, Wis. Medical Physics Pub.

Khan, F. (2003). *The Physics of Radiation Therapy*. (3rd Edition). Williams and Wilkins, Baltimore.

Morris, S. (2001). *Radiotherapy physics and equipment*. Churchill Livingstone.

Purdy, J A. (2001) *3-D conformal and intensity modulated radiation therapy : physics & clinical applications*. Madison, WI, U.S.A. Advanced Medical Pub.

Roberts, D., & Smith, N. (1988). *Radiographic Imaging*. Churchill Livingstone.

Stanton, R., & Stinton, D. (1992). *An Introduction to Radiation Oncology Physics*. Medical Physics Publishing.

Washington, C.M., & Leaver, D.T. (2016) *Principles and Practice of Radiation Therapy*. (4th Edition). Mosby, St Louis, Missouri.

European Society for Therapeutic Radiography and Oncology (ESTRO) <http://www.estro.org>

American Association of Physicists in Medicine (AAPM) <http://www.aapm.org/>

International Atomic Energy Agency (IAEA) <http://www.iaea.org/>

Varian Medical Systems <http://www.varian.com/>

Elekta <http://www.elekta.com/>

GE Healthcare <http://www.gehealthcare.com>

US National Cancer Institute <http://www.cancer.gov/>

Siemens Medical <http://www.medical.siemens.com>

YEAR TWO PAPERS

RADT211	Radiation Therapy Practice II
RADT212	Principles of Research
RADT213	Advanced Healthcare Communication
RADT214	Radiation Technology II
RADT215	Radiation Therapy and Oncology II
RADT216	Radiation Therapy Planning Concepts II

RADT211 Radiation Therapy Practice II

Paper Code	RADT211
Date	January 2018
Duration	640 hours contact and 110 hours independent learning
Points	60
Aim	Consolidation of academic learning in Year I: the student will gain knowledge and acquire skill to undertake the routine tasks of a radiation therapist, under supervision
Recommended Entry Level	Successful completion of all Year I papers

Learning outcomes

On completion of this paper the successful student will be able to, across three work areas:
CT, planning and treatment;

1. demonstrate knowledge and efficient practice;
2. recognise patient needs and/or significant changes in patients' condition;
3. demonstrate appropriate verbal and nonverbal communication skills;
4. demonstrate the ability to work in a healthcare team;
5. demonstrate appropriate self-management techniques;
6. demonstrate safe practices in the workplace;
7. demonstrate the ability to identify problems in the clinical setting;
8. develop an increasing awareness of quality assurance;
9. demonstrate reflective practice.

Content:

Corresponding to Learning Outcome 1

- a) Description of routine radiation therapy practice
- b) Rationale for routine radiation therapy practice
- c) Comprehend the practical application of theory and technical skills
- d) Understand workflow
- e) Patient safety and comfort

Corresponding to Learning Outcome 2

- a) Physical, social and emotional needs of patients
- b) Treatment reactions and management, including medication
- c) Expected response to treatment
- d) Indicators for reassessing patient condition
- e) Appropriate referral

Corresponding to Learning Outcome 3

- a) Written records and reports
- b) Verbal reporting
- c) Verification of information
- d) Patient communication
- e) Staff communication
- f) Listening skills
- g) Establishing rapport

Corresponding to Learning Outcome 4

- a) Roles of multi-disciplinary team members
- b) Channels of communication

- c) Sources of conflict and dealing with conflict

Corresponding to Learning Outcome 5

- a) Emotional responses RTs may have when working with patients and colleagues
- b) Appropriate coping strategies
- c) Time management
- d) Initiative/responsibility

Corresponding to Learning Outcome 6

- a) Potential hazards and risks
- b) Safety regulations, procedures and protocols
- c) Equipment faults

Corresponding to Learning Outcome 7

- a) Identification of problems in the clinical setting

Corresponding to Learning Outcome 8

- a) Quality management systems
- b) Clinical quality assurance procedures

Corresponding to Learning Outcome 9

- a) Observe, participate in, question and evaluate practice

Suggested Learning and Teaching Approaches

The learning outcomes of this paper could be achieved by the following:

- clinical practice in Department A;
- tutorials with an emphasis on group discussion;
- seminar, case study, project presentations, journal club, study days and conferences;
- accessing media: journals, texts, newspaper articles and television provide a rich source of material for discussion, exploration;
- utilising a variety of small scale investigative techniques, participation in audit and research culminating in evidence based practice.

Assessment of Learning Outcomes

Summative assessment will consist of all outcomes within each domain:

- CT assessment = Pass/Fail
- Planning assessment = Pass/Fail
- Treatment assessment = Pass/Fail
- and
- clinical journal = Pass/Fail

A pass will be awarded to all students who gain a pass in each domain.

Students will need to gain 640 clinical hours for the semester in which they have enrolled and have a valid first aid certificate.

Reassessment:

- reassessment can occur for the clinical journal
- reassessment can occur in two domains for each enrolment of the paper
- if a student fails all three domains they are not eligible for reassessment and fail the paper overall.

Reporting Results to Students

Results will be reported to students as Pass/Fail.

Students will normally be required to retake all assessment components in a repeat enrolment.

Resources

Bridge, P. & Tipper, D. J. (2017). *CT Anatomy for Radiotherapy*. (2nd ed.)Cumbria: M&K Publishing.

Hass, M.L., Hogle, W.P., Moore-Higgs, G.J. & Gosselin-Acomb, T.K. (2007). *Radiation Therapy: A guide to patient care*. Mosby Elsevier, St Louis.

International Commission on Radiation Units and Measurements: (1993) Prescribing, Recording, and Reporting Photon Beam Therapy. (ICRU Report 50)

International Commission on Radiation Units and Measurements; (1999) Prescribing, Recording, and Reporting Photon Beam Therapy. Supplement to ICRU 50 Report (ICRU Report 62)

Faithfull, S., & Wells, M. (2003). *Supportive Care in Radiotherapy*. Churchill Livingstone, UK.

Washington, C.M., & Leaver, D.T. (2016). *Principles and Practice of Radiation Therapy*. (4th Edition). Mosby, St Louis, Missouri.

RADT212 Principles of Research

Paper Code	RADT212
Date	July 2018
Duration	25 contact hours and 50 hours of independent learning
Points	6
Aim	Student will have a basic understanding of different research methodologies that underpin quantitative and qualitative research.
Recommended Entry Level	Successful completion of all Year I papers

Learning outcomes:

On completion of this paper the successful student will be able to:

1. describe the difference between quantitative or qualitative research;
2. demonstrate a basic understanding of different study designs;
3. demonstrate a basic understanding of the process involved in obtaining ethical approval for research involving human subjects;
4. produce a critical analysis of two research papers on a chosen topic.

Content:

Corresponding to Learning Outcome 1

- a) Quantitative versus qualitative research
- b) Literature reviews versus primary research

Corresponding to Learning Outcome 2

- a) Study designs of quantitative methodologies: cell based studies, animal studies, clinical trials, questionnaire-based studies
- b) Study designs of qualitative methodologies: questionnaire-based studies: quality of life, focus groups, interviews, ethnographic research, observational research, action based research, critical theory research
- c) Limitations inherent to different study designs: confounding factors, interpretation of scope of results
- d) Statistical analyses appropriate for different study designs

Corresponding to Learning Outcome 3

- a) Research ethics
- b) Participant information sheets and informed consent
- c) Maori Consultation
- d) Locality assessment approval

Corresponding to Learning Outcome 4

- a) Description and analysis of two research papers

Suggested Learning and Teaching Approaches

The learning outcomes of this paper should be achieved by the following:

- Lectures to introduce research concepts and that invite student participation and debate;
- Student centred tutorials with an emphasis on class discussion and debate;
- Workshops by guest speakers who will contribute to the overall research experience from their own unique research background.

Assessment of Learning Outcomes

Summative assessment will consist of the following:

- quantitative assignment = 50% of total mark
- qualitative assignment = 50% of total mark

A pass will be awarded to all students who gain 50% overall.

Reporting Results to Students

Results will be reported to students as:

Coursework 100

Student result notices will carry grades from A to E.

Resources

Greenhalgh, T. (2014). *How to read a paper: the basics of evidence-based medicine*. (5th Ed.). John Wiley & Sons: Chichester, UK

Liamputtong, P. (2013). *Qualitative Research Methods*. (5th Edition). Oxford University Press, Australia & New Zealand.

Liamputtong, P. (2010) (Ed.). *Research Methods in Health: Foundations for evidence-based practice*. Oxford University Press, Melbourne

Peat, J. (2001). *Health Science Research. A handbook of quantitative methods*. Allen & Unwin, NSW, Australia.

Wright-St Clair, V., Reid, D., Shaw, S., Ramsbotham, S. (Eds.). (2014). *Evidence-based health practice*. Oxford University Press: Australia & New Zealand

RADT213 Advanced Healthcare Communication

Paper Code	RADT213
Date	July 2018
Duration	50 contact hours and 75 hours of independent learning
Points	10
Aim	To enable the student to develop effective interpersonal skills when working with patients in pain (curative and palliative) and/or terminally ill
Recommended Entry Level	Successful completion of RADT126: Health and Human Behaviour and RADT125: Healthcare Communication

Learning outcomes

On completion of this paper the successful student will be able to:

1. describe factors that may influence an individual's perception of pain, including cancer-related pain (curative and palliative), and relate these to the role of the radiation therapist;
2. identify non-pharmacological methods of pain management and relate these to the role of the radiation therapist;
3. discuss the psychosocial impact of terminal illness on an individual and their family;
4. identify appropriate responses to individuals and their family who are coping with terminal illness;
5. discuss appropriate personal management strategies to lessen the impact on self of working with patients who are in pain and/or terminally ill;
6. discuss the impact of delivering palliative treatment on teams.

Content:

Corresponding to Learning Outcome 1

- a) Causes and classifications of pain
- b) Basic physiology of pain perception
- c) Factors that modify pain perception - cultural, social, psychological and physical
- d) Basic pain assessment in the radiation therapy setting

Corresponding to Learning Outcome 2

- a) Strategies to assist patients cope with pain
 - Physical therapies
 - Psychological and psychosocial methods of pain management

Corresponding to Learning Outcome 3

- a) Attitudes towards death and dying in self and others
- b) Psychosocial consequences of terminal illness for the individual and family
- c) Cross cultural differences in coping with hospitalisation, illness and terminal illness
- d) Models of grieving, including contextual influences on grief
- e) Basic grief assessment and intervention

Corresponding to Learning Outcome 4

- a) Effective communication skills when working with patients, in pain and/or grieving, and their family in the radiation therapy setting
- b) Counselling as a helping tool
- c) Cultural competence in palliative context

- d) Identification of support systems for patient receiving radiation therapy, in pain and/or with palliative intent, and their family

Corresponding to Learning Outcome 5

- a) Identification of grief responses in self
- b) Management of self when working with palliative intent
- c) Strategies to minimise effects on self when working in a palliative context

Corresponding to Learning Outcome 6

- a) Impact of delivering palliative treatment on teams
- b) Strategies to promote effective collaboration and participation within teams when treating patients with palliative intent

Suggested Learning and Teaching Approaches

The learning outcomes of this paper could be achieved by the following:

- student centred tutorials with an emphasis on class discussion and debate;
- guest speakers who are able to offer current and practical information on topics;
- case studies and problem based learning;
- simulated clinical scenarios with the lecturer, actors and others modelling and coaching appropriate behaviours;
- seminar and project presentations;
- the use of media such as videos, journals, texts, newspaper articles and television will provide a rich source of material for discussion, exploration and debate;
- use of a variety of small scale investigative techniques;
- the teaching material should draw on the student's personal and professional experiences and encourage critical inquiry and examination of the "taken for granted world".

Assessment of Learning Outcomes

Summative assessment will consist of the following:

- assignment 1 = 50% of total mark
- assignment 2 = 50% of total mark

Formative assessment will consist of participation in a communication skills workshop and submission of a written self-reflection assignment in order to meet coursework terms.

A pass will be awarded to all students who gain 50% overall in the summative assessment and participate in the communication skills workshop.

Reporting Results to Students

Results will be reported to students as follows:

Coursework 100

Student result notices will carry grades from A to E.

Resources

Berger, A.M., Shuster, J.L., & von Roenn, J.H. (Eds.). (2007). *Principles and practice of palliative care and supportive oncology*. Philadelphia: Lippincott Williams & Wilkins.

Berglund, C. (2012). *Ethics for health care*. (4th Edition). Melbourne. Oxford University Press.

- Bruera, E.D., & Portenoy, R.K. (2003). *Cancer pain: assessment and management*. Cambridge: Cambridge University Press.
- Doka, K.J. (Ed.). (2007). *Living with grief: before and after the death*. Washington, D.C.: Hospice Foundation of America.
- Klass, D., Silverman, P.R., & Nickman, S.L. (1998). *Continuing bonds: new understandings of grief*. Washington DC: Taylor and Francis.
- Koenig, H.G. & Bowman, G.W. (2013). *Dying, grieving, and family: A pastoral care approach*. Hoboken: Taylor and Francis.
- Kubler-Ross, L. (1969). *On Death and Dying*. New York: Macmillan.
- Lloyd-Williams, M. (2003). *Psychosocial issues in palliative care*. Oxford: Oxford University Press.
- Main, C.J., & Spanswick, C.C. (Eds.). (2000). *Pain Management: An interdisciplinary approach*. Edinburgh: Harcourt Publishes Ltd.
- Ministry of Health (2001). *The New Zealand Palliative Care Strategy*. Wellington: Ministry of Health.
- Neimeyer, R.A. (Ed.). (2002). *Meaning reconstruction and the experience of loss*. (2nd Edition). Washington DC; American Psychological Association.
- Neuberger, J. (2004). *Dying well: a guide to enabling a good death*. Oxford: Radcliffe.
- Northouse, L.L., & Northouse, P.G. (1998). *Health communication*. (3rd Edition). Appleton & Hall, USA.
- Schwass, M. (Ed.). (2005). *Last words: Approaches to Death in New Zealand's cultures and faiths*. Wellington: Bridget Williams Books and FDANZ.
- Skevington, S. (1995). *Psychology of pain*. Chichester: Wiley.
- Stroebe, M. S, & Schut W. (2001). *Handbook of bereavement research: consequences, coping, and care*. Washington, D.C.: American Psychological Association.
- Strong, J. (Ed.). (2002). *Pain: a textbook for therapists*. Edinburgh: Churchill Livingstone.
- Victoria Hospice Society, Cairns, M., Thompson, M., & Wainwright, W. (2003). *Transitions in dying and bereavement: a psychosocial guide for hospice and palliative care*. Baltimore: Health Professions Press.
- Walsh-Burke, K. (2006). *Grief and loss: theories and skills for helping professionals*. Boston: Pearson Allyn & Bacon.
- Worden, J. (2002). *Grief Counselling and Grief Therapy*. (3rd Edition). A Handbook for the Mental Health Practitioner. Springer, New York.

RADT214 Radiation Technology II

Paper Code	RADT214
Date	July 2018
Duration	80 contact hours and 120 hours of independent learning
Points	16
Aim	To enable students to apply their understanding of computers, radiation therapy equipment, radiation therapy physics and imaging to the planning and delivery of radiation therapy
Recommended Entry Level	Successful completion of RADT127: Radiation Technology I

Learning outcomes

On completion of this paper the successful student will be able to:

1. describe the role of the different types of radiation for use in radiation therapy;
2. describe the process for machine calibration and quality control;
3. describe radiation detection and measurement;
4. discuss quality assurance systems in radiation therapy;
5. discuss treatment and imaging technology in radiation therapy;
6. discuss the use of radioactive materials in radiation therapy.

Content:

Corresponding to Learning Outcome 1

- a) Photons – absorption processes
- b) Electrons – absorption in tissue, depth doses, isodoses
- c) Other particles, principally protons

Corresponding to Learning Outcome 2

- a) Radiation detectors and calibration
- b) Machine calibration

Corresponding to Learning Outcome 3

- a) Radiation detectors for use in phantoms and on patients
- b) Radiation measurement

Corresponding to Learning Outcome 4

- a) Principles of quality assurance
- b) Systems of quality assurance
- c) Rationale for quality assurance

Corresponding to Learning Outcome 5

- a) Imaging Techniques: CT, MRI, PET, OBI
- b) IGRT and clinical applications
- c) IMRT, VMAT and Tomotherapy
- d) Stereotactic techniques

Corresponding to Learning Outcome 6

- a) Distinguish between sealed and unsealed sources
- b) Brachytherapy loading techniques and delivery systems
- c) Unsealed therapy procedures
- d) Safety and quality assurance

Suggested Learning and Teaching Approaches

The learning outcomes of this paper could be achieved by the following:

- lectures
- student centred tutorials
- laboratory demonstrations and practical sessions

Assessment of Learning Outcomes

Summative assessment will consist of the following:

- test 1 = 20% of total mark
- assignment = 20% of total mark
- test 2 = 20% of total mark
- final 2 hour written examination = 40% of total mark

50% must be gained in the coursework to be eligible to take the final examination.

A pass will be awarded to all students who gain a minimum of 50% in the examination and 50% overall.

Reporting Results to Students

Results will be reported to students as follows:

Coursework	60
Final examination	40
TOTAL	100

Student result notices will carry grades from A to E.

Resources

Ball, J., & Moore, A. (1997) *Essential Physics for Radiographers*. Blackwell Scientific.

Bomford, C.K. & Kunkler, I.H. (2003) *Walter and Miller's Textbook of radiotherapy : radiation, physics, therapy and oncology*. (6th ed.) Edinburgh, Churchill Livingstone.

Bushong, S C. (2001) *Radiologic science for technologists : physics, biology, and protection*. St. Louis : Mosby.

Bushberg, J. T. (2002) *The essential physics of medical imaging*. Philadelphia, Pa.; London : Lippincott Williams & Wilkins.

Graham, D.T., Cloke, P. & Vosper, M. (2011). *Principles of Radiological Physics*. (6th Edition). Churchill Livingstone.

Guy, G. & Ffytche, D. (2005) *An introduction to the principles of medical imaging*. London : Imperial College Press.

Hendee, W. & Ritenour R. (2002). *Medical imaging physics*. New York ; Chichester : Wiley-Liss.

Hazle, J D. & others (1998) *Imaging in radiation therapy : American Association of Physicists in Medicine 1998 Summer School proceedings*, University of Wisconsin, Madison, Wisconsin. Madison, WI : Published for the American Association of Physicists in Medicine by Medical Physics Pub.

Khan, F. (2003). *The Physics of Radiation Therapy*. (3rd Edition). Williams and Wilkins, Baltimore.

Morris, S. (2001). *Radiotherapy physics and equipment*. Churchill Livingstone.

Podgorsak, E.B., ed. (2005) *Radiation Oncology Physics: A Handbook For Teachers And Students* International Atomic Energy Agency Vienna, 2005

Purdy, J A. (2001) *3-D conformal and intensity modulated radiation therapy : physics & clinical applications*. Madison, WI, U.S.A. Advanced Medical Pub.

Washington, C.M., & Leaver, D.T. (2016) *Principles and Practice of Radiation Therapy*. (4th Edition). Mosby, St Louis, Missouri.

European Society for Therapeutic Radiography and Oncology (ESTRO) <http://www.estro.org>

American Association of Physicists in Medicine (AAPM) <http://www.aapm.org/>

International Atomic Energy Agency (IAEA) <http://www.iaea.org/>

Varian Medical Systems <http://www.varian.com/>

Elekta <http://www.elekta.com/>

GE Healthcare <http://www.gehealthcare.com>

US National Cancer Institute <http://www.cancer.gov/>

Siemens Medical <http://www.medical.siemens.com>

RADT215 Radiation Therapy and Oncology II

Paper Code	RADT215
Date	July 2018
Duration	60 contact and 65 hours of independent learning
Points	10
Aim	To enable the student to integrate their knowledge of oncology and treatment modalities to determine optimal treatment for malignant disease
Recommended Entry Level	Successful completion of RADT123: Radiation Therapy and Oncology I

Learning outcomes

On completion of this paper the successful student will be able to:

1. discuss the oncology of and the clinical rationale for selecting appropriate treatment for the stated 'Site List' (tumours that are commonly treated clinically);
2. discuss the implications of the Cartwright Inquiry.

Content:

Corresponding to Learning Outcome 1

Site List

- skin (SCC, BCC, melanoma)
- urogenital (bladder, testes, prostate)
- gynaecological (cervix, endometrium, ovary)
- gastrointestinal (oesophagus & rectum)
- head & neck (pituitary & larynx)

- a) Patient assessment methods
- b) Tumour pathology and characteristics
- c) Combined modality treatments with a focus on radiation therapy techniques (including palliation)
- d) Typical treatment reactions

Corresponding to Learning Outcome 2

- a) Ethical issues highlighted by the Cartwright Report
- b) Recommended investigations for cervical cancer
- c) Significance of the Cartwright Inquiry

Suggested Learning and Teaching Approaches

The learning outcomes of this paper could be achieved by the following:

- student centred tutorials with an emphasis on class discussion and debate;
- seminar and project presentations;
- the use of media such as VERT, videos, journals, texts, newspaper articles and television documentaries will provide a rich source of material for discussion, and exploration.

Assessment of Learning Outcomes

Summative assessment will consist of the following:

- test = 30% of total mark
- group presentation = 30% of total mark
- final 2 hour written examination = 40% of total mark

50% must be gained in the coursework to be eligible to take the final examination.
A pass will be awarded to all students who gain 50% minimum in the examination and 50% overall.

Reporting Results to Students

Results will be reported to students as follows:

Coursework out of	60
Final examination out of	40
TOTAL	100

Student result notices will carry grades from A to E.

Resources

Barrett, A., Dobbs, J., Morris, S., & Roques, T. (2009). *Practical Radiotherapy Planning*. (4th Edition). London: Hodder education

Bomford, C.K. & Kunkler, I.H. (2003). *Walter & Miller's Textbook of radiotherapy: radiation, physics, therapy and oncology*. (6th Edition). Edinburgh: Churchill Livingstone.

Bryant, B., & Knights K. (2007). *Pharmacology for Health Professionals* (2nd Edition). Sydney: Mosby Elsevier.

Hass, M.L., Hogle, W.P., Moore-Higgs, G.J. & Gosselin-Acomb, T.K. (2007). *Radiation Therapy: A guide to patient care*. St Louis: Mosby Elsevier.

International Commission on Radiation Units and Measurements: (1993) *Prescribing, Recording, and Reporting Photon Beam Therapy*. (ICRU Report 50)

International Commission on Radiation Units and Measurements: (1999) *Prescribing, Recording, and Reporting Photon Beam Therapy*. Supplement to ICRU 50 (ICRU Report 62).

Lu, J.J & Brady, L.W. (Eds.). (2011). *Decision making in radiation oncology* Vol 1 & Vol 2. Berlin: Springer.

Moller, T.B. & Reif, E. (2006). *Pocket Atlas of Sectional Anatomy, CT and MRI*, Vol 1 & Vol 2. (3rd Edition). Thieme: New York.

Tortora, G.J. & Derrickson, B. (2009). *Principles of Anatomy and Physiology*. (12th Edition). John Wiley & Sons.

Washington, C.M. & Leaver, D.T. (2016). *Principles and Practice of Radiation Therapy*. (4th Edition). Mosby, St Louis, Missouri.

Webber, E.C., Vilensky, J.A. & Carmichael, S.W. (2009). *Netter's Concise Radiologic Anatomy*. Saunders, an imprint of Elsevier Inc.

RADT216 Radiation Therapy Planning Concepts II

Paper Code	RADT216
Date	July 2018
Duration	100 Contact and 125 hours of independent learning
Points	18
Aim	To enable students to understand the concepts of radiation therapy treatment planning to enable the planning of standard techniques
Recommended Entry Level	Successful completion of RADT123: Radiation Therapy & Oncology I and RADT124: Radiation Therapy Planning Concepts I

Learning outcomes

On completion of this paper the successful student will be able to:

1. demonstrate knowledge and application of calculations used in radiation therapy;
2. demonstrate knowledge, application of principles and concepts of computer planning for critiquing standard techniques;
3. demonstrate an understanding of imaging and anatomy, relevant to computer planning;
4. discuss the effects of radiation on biological systems.

Content:

Corresponding to Learning Outcome 1

- a) Calibration conditions
- b) Inverse square law
- c) Attenuation factors for SSD and SAD techniques
- d) Manual calculations of radiation therapy SSD and SAD treatment techniques including shielding and extended SSD
- e) Justification of factors used and resulting MU

Corresponding to Learning Outcome 2

- a) Consolidate knowledge of computer planning principles by producing a range of standard radiation therapy plans. Principles to include:
 - isodose distributions
 - ICRU 50/62
 - Normalisation
 - Weighting
 - beam energy, d-max, exit dose and arrangement
 - inhomogeneities
 - wedges
 - monitor units
 - field verification
 - organs at risk
 - contouring methods
 - volume transfer
- b) Apply computer planning principles by students critiquing the plans produced

Corresponding to Learning Outcome 3

- a) Applied anatomy and imaging
- b) Diagnostic imaging e.g. CT, SPECT, PET, MRI
- c) Image fusion

Corresponding to Learning Outcome 4

- a) Radiation chemistry
- b) Mammalian cell sensitivity
- c) Physical modification of radiation exposure
- d) Acute radiation syndrome
- e) Late effects of radiation

Suggested Learning and Teaching Approaches

The learning outcomes of this paper could be achieved by the following:

- practical laboratory tutorials for computer planning;
- student centred tutorials with an emphasis on class discussion and debate;
- the use of media such as videos, journals, and texts, will provide a rich source of material for discussion, and exploration.

Assessment of Learning Outcomes

Summative assessment will consist of the following:

- assignment = 30% of total mark
- radiobiology test = 20% of total mark
- viva* (60% pass mark) = 50% of total mark

*consists of plan generation and discussion

A pass will be awarded to all students who gain 50% minimum overall.

Reassessment

- one reassessment can occur if the pass mark of 60% is not achieved in the dosimetry viva;
- any student requiring a viva reassessment will only be able to gain a final minimum pass mark of 60%.

Reporting Results to Students

Results will be reported to students as follows:

Coursework	100
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Student result notices will carry grades from A to E.

Resources

Eclipse™ Treatment Planning System

Barrett, A., Dobbs, J., Morris, S., & Roques, T. (2009). *Practical Radiotherapy Planning*. (4th ed.) London: Hodder education

Bomford, C.K. & Kunkler, I.H. (2003) *Walter and Miller's Textbook of radiotherapy : radiation, physics, therapy and oncology*. (7th ed. 2012) Edinburgh, Churchill Livingstone.

Bushberg, J. T. (2002) *The essential physics of medical imaging*. (3rd ed. 2012) Philadelphia, Pa.; London : Lippincott Williams & Wilkins.

Giancoli, D.C. (2005). *Physics - Principles with Applications*. (7th ed. 2015). Prentice Hall, USA.

Hass, M.L., Hogle, W.P., Moore-Higgs, G.J. & Gosselin-Acomb, T.K. (2007). *Radiation Therapy: A guide to patient care*. Mosby Elsevier, St Louis.

Hendee, W. & Ritenour R. (2002). *Medical imaging physics*. New York ; Chichester : Wiley-Liss,

International Commission on Radiation Units and Measurements: (1993) *Prescribing, Recording, and Reporting Photon Beam Therapy*. (ICRU Report 50)

International Commission on Radiation Units and Measurements: (1999) *Prescribing, Recording, and Reporting Photon Beam Therapy*. Supplement to ICRU 50 (ICRU Report 62).

International Commission on Radiation Units and Measurements: (2010) *Prescribing, Recording, and Reporting Photon Beam Intensity-Modulated Radiation Therapy (IMRT)* (ICRU Report 83)

Khan, F. (2003). *The Physics of Radiation Therapy*. (5th ed. 2014) Williams and Wilkins, Baltimore.

Moller, T.B. & Reif, E. (2006). *Pocket Atlas of Sectional Anatomy, CT and MRI, Vol 1 & Vol 2*. (4th ed.2013). Thieme, New York.

Morris, S. (2001). *Radiotherapy physics and equipment*. Churchill Livingstone.

Purdy, J A. (2001) *3-D conformal and intensity modulated radiation therapy : physics & clinical applications*. Madison, WI, U.S.A. Advanced Medical Pub.

Stanton, R., & Stinton, D. (1992). *An Introduction to Radiation Oncology Physics*. Medical Physics Publishing.

Washington, C.M. & Leaver, D.T. (2016). *Principles and Practice of Radiation Therapy*. (4th Edition). Mosby, St Louis, Missouri.

Webber, E.C., Vilensky, J.A. & Carmichael, S.W. (2009). *Netter's Concise Radiologic Anatomy*. (2nd ed. 2014) Saunders, an imprint of Elsevier Inc.

YEAR THREE PAPERS

- RADT311 Radiation Therapy Practice III
- RADT312 Literature Analysis
- RADT313 Professional Development
- RADT314 Radiation Therapy and Oncology III
- RADT315 Radiation Therapy Planning Concepts III

RADT311 Radiation Therapy Practice III

Paper Code	RADT311
Date	July 2018
Duration	640 contact hours and 110 hours of independent learning
Points	60
Aim	To enable the student to demonstrate the ability to effectively carry out the duties of a radiation therapist, taking responsibility for his/her actions, under the supervision of a qualified radiation therapist
Recommended Entry Level	Successful completion of RADT312, 313, 314 and 315

Learning outcomes

On completion of this paper the successful student will be able to:

1. demonstrate consistent and safe practice
2. demonstrate understanding of quality assurance procedures;
3. demonstrate the ability to identify error and problem solving skills;
4. demonstrate consistent and optimal patient care: assessment, advice and managing patient needs;
5. demonstrate well developed communication skills;
6. demonstrate reflective practice and utilise coping strategies in the context of illness, grief, death and dying.

Content:

Corresponding to Learning Outcome 1

- a) Description and rationale of routine radiation therapy practice
- b) Demonstrate consistent routine radiation therapy practice (including technical competence)

Corresponding to Learning Outcome 2

- a) Demonstrate safe practice
- b) Demonstrate quality assurance practices in the clinical setting

Corresponding to Learning Outcome 3

- a) Identification of problems/error in clinical setting
- b) Demonstrate problem solving techniques in clinical setting
- c) Evaluation of problem solving outcomes

Corresponding to Learning Outcome 4

- a) Recognise patient needs and/or significant change in patient condition
- b) Assess, advise and manage patient needs
- c) Communicate information accurately and effectively

Corresponding to Learning Outcome 5

- a) Written records and reports Verification of information
- b) Verbal and non-verbal communication skills
- c) Works professionally with appropriate demeanour
- d) Teamwork, including multidisciplinary healthcare team

Corresponding to Learning Outcome 6

- a) High level of self-awareness

- b) Ability to recognise critical incidents
- c) Effective coping strategies

Suggested Learning and Teaching Approaches

The learning outcomes of this paper could be achieved by the following:

- clinical practice in Department B;
- tutorials with an emphasis on group discussion;
- seminar, case study project presentations, journal club, study days and conferences;
- accessing media: journals, texts, newspaper articles and television provide a rich source of material or discussion, exploration;
- utilisation of a variety of small scale investigative techniques, involvement in audit and research culminating in evidence based practice

Assessment of Learning Outcomes

Summative assessment will consist of all outcomes within each domain:

- | | | |
|------------------------|---|-----------|
| • CT assessment | = | Pass/Fail |
| • Planning assessment | = | Pass/Fail |
| • Treatment assessment | = | Pass/Fail |

A pass will be awarded to all students who gain a pass in each domain.

Students will need to gain 640 clinical hours for the semester in which they have enrolled and have a valid first aid certificate.

Reassessment:

- reassessment can occur in two domains for each enrolment of the paper.
- if a student fails all three domains they are not eligible for reassessment and fail the paper overall.

Reporting Results to Students

Results will be reported to students as Pass/Fail

Students will normally be required to retake all assessment components in a repeat enrolment

Resources

Bridge, P. & Tipper, D. J. (2017). *CT Anatomy for Radiotherapy*. (2nd ed.)Cumbria: M&K Publishing.

Hass, M.L., Hogle, W.P., Moore-Higgs, G.J. & Gosselin-Acomb, T.K. (2007). *Radiation Therapy: A guide to patient care*. Mosby Elsevier, St Louis.

International Commission on Radiation Units and Measurements: (1993) *Prescribing, Recording, and Reporting Photon Beam Therapy*. (ICRU Report 50)

International Commission on Radiation Units and Measurements; (1999) *Prescribing, Recording, and Reporting Photon Beam Therapy*. Supplement to ICRU 50 Report (ICRU Report 62)

Faithfull, S., & Wells, M. (2003). *Supportive Care in Radiotherapy*. Churchill Livingstone, UK.

Washington, C.M., & Leaver, D.T. (2016). *Principles and Practice of Radiation Therapy*. (4th Edition). Mosby, St Louis, Missouri.

RADT312 Literature Analysis

Paper Code	RADT312
Date	January 2018
Duration	30 contact hours and 120 hours of independent learning
Points	12
Aim	For students to critically analyse and report on research using quantitative and qualitative methodologies within the radiation therapy setting
Recommended Entry Level	Satisfactory completion of RADT212: Principles of Research

Learning outcomes

On completion of this paper the successful student will be able to:

1. present and discuss a paper on a topic of interest and apply it to the radiation therapy setting;
2. competently analyse and report on 3 primary research papers on a topic of their choice and apply it to the radiation therapy setting;
3. present an overview of the literature review in a poster discussion.

Content:

Corresponding to Learning Outcome 1

- a) Critical analysis of a research paper (quantitative or qualitative) that explores a chosen area of interest and apply it to the radiation therapy setting
- b) Understanding of research design, including ethical considerations

Corresponding to Learning Outcome 2

- a) Critical analysis of 3 papers (quantitative and qualitative) that explore a chosen area of interest and apply it to the radiation therapy setting
- b) Understanding of how to write a small literature review

Corresponding to Learning Outcome 3

- a) Presentation of the outcome of the small literature review in the form of a poster discussion.

Suggested learning and Teaching Approaches

Student centred tutorials

Assessment of Learning Outcomes

Summative assessment will consist of the following:

- journal club = 20% of total mark
- literature review = 40% of total mark
- poster discussion = 40% of total mark

A pass will be awarded to all students who gain 50% overall.

Reporting Results to Students

Results will be reported to students as follows:

Coursework out of 100

Student result notices will carry grades from A to E.

Resources

Davidson, C. & Tolich, M. (2007). *Social Science Research in New Zealand*. Pearson, Prentice Hall, Australia.

Liamputtong, P. (2013). *Qualitative Research Methods*. (5th Edition). Oxford University Press, Australia & New Zealand.

Liamputtong, P. (2010). (Ed.). *Research methods in health: Foundations for evidence-based practice*. Oxford University Press, Melbourne.

Peat, J. (2001). *Health Science Research. A handbook of quantitative methods*. Allen & Unwin, NSW, Australia.

Polgar, S., & Thomas, S. (2008). *Introduction to Research in the Health Sciences*. (5th Edition).

RADT313 Professional Development

Paper Code	RADT313
Date	February 2018
Duration	58 contact and 92 hours of independent learning
Points	12
Aim	For students to develop their own knowledge and skills and to demonstrate personal, people and organisational development
Recommended Entry Level	Successful completion of RADT213: Advanced Healthcare Communication

Learning outcomes

On completion of this paper the successful student will be able to:

1. determine a personally and professionally acceptable vision of the role of a radiation therapist and be able to integrate this professional role into other life roles.
2. identify own role and responsibilities within radiation therapy and healthcare teams.
3. identify conflict resolution strategies appropriate to the radiation therapy context.
4. describe appropriate strategies to minimise the development of burnout in the workplace.
5. demonstrate the skills of reflective practice as part of ongoing professional development.
6. consider issues relevant to future career planning.
7. identify own learning needs and how to fulfil these needs.
8. identify the structure and functions of the health care system in New Zealand and the role of radiation therapy within the health care system.

Content:

Corresponding to Learning Outcome 1

- a) Professional socialisation
- b) Radiation therapists as members of a profession - roles and responsibilities
- c) Professional values and ethical practice
- d) Social media and professionalism
- e) Problem solving within a moral/ethical and medico-legal framework
- f) Moral dimensions of the role of the radiation therapist
- g) Social media and professional practice

Corresponding to Learning Outcome 2

- a) Structure of radiation therapy and healthcare teams
- b) Team dynamics
- c) Communication and teamwork
- d) Working in multi-disciplinary teams
- e) Interprofessionalism

Corresponding to Learning Outcome 3

- a) Common sources of conflict in healthcare
- b) Strategies for dealing with conflict
- c) Personal management strategies

Corresponding to Learning Outcome 4

- a) Origins and types of stressors
- b) Consequences of stress: cognitive, emotional, physical, behavioural
- c) Positive and negative coping mechanisms
- d) Strategies to prevent or minimise the effects of stress
- e) Causes and consequences of burnout in a health care setting
- f) Strategies for dealing with burnout

Corresponding to Learning Outcome 5

- a) Reflective practice and novice practitioners
- b) Processes of critical reflective practice
- c) Supervision, peer mentoring, other supports and debriefing

Corresponding to Learning Outcome 6

- a) Issues relevant to future professional development and career planning
- b) CV's, letters of application
- c) Interview skills

Corresponding to Learning Outcome 7

- a) Maintenance of professional standards
- b) Lifelong learning and continuing professional development

Corresponding to Learning Outcome 8

- a) Structure of the New Zealand health care system, historical and current
- b) Cancer Control Strategy and the role of radiation therapy in the New Zealand health care system
- c) Medico-legal dimensions of the role of the radiation therapist and moral agency (to include HDC and HPCA)
- d) Codes of ethics and the radiation therapist
- e) New Zealand Institute of Medical Radiation Technology
- f) Medical Radiation Technologists Board

Suggested Learning and Teaching Approaches

The learning outcomes of this paper could be achieved by the following:

- student centred tutorials with an emphasis on class discussion and debate;
- seminar and project presentations;
- the use of media such as videos, journals, texts, newspaper articles and television will provide a rich source of material for discussion, and exploration;
- use of current research in scholarly journals
- simulated clinical scenarios with the lecturer, actors and others modelling and coaching appropriate behaviours.

Assessment of Learning Outcomes

Summative assessment will consist of the following:

- CPD assessment = 50% of total mark
 - Part A – assignment (25%)
 - Part B - presentations (25%)
- professional issues assignment = 50% of total mark

Formative assessment will consist of participation in a communication skills workshop and submission of a written self-reflection assignment; plus participation in the Interprofessional Education (IPE) component in order to meet coursework requirements (terms).

A pass will be awarded to all students who gain 50% overall and participate in the communication skills workshop.

Reporting Results to Students

Results will be reported to students as follows:

Coursework	100
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Student result notices will carry grades from A to E.

Resources

Ministry of Health reports: www.moh.govt.nz

Berglund, C. (2012). *Ethics for health care*. 4th Ed. Melbourne: Oxford University Press.

Bulman, C. and Schutz, S. (Eds.). (2008). *Reflective practice in nursing*. Oxford: Blackwell.

Higgs, J., Croker, A., Tasker, D., Hummell, J., & Patton, N. (Eds.). (2014). *Health practice relationships*. Rotterdam: Sense Publishers.

Howatson-Jones, L. (2013). *Reflective practice in nursing*. (2nd Ed.). Los Angeles: SAGE.

Johns, C. & Burnie, S. (2013). *Becoming a reflective practitioner*. (4th Ed.). Chichester, West Sussex: John Wiley & Sons.

Linsley, P. (2006). *Violence and aggression in the workplace: a practical guide for all healthcare staff*. Abingdon: Radcliffe.

Miller, K. (2009). *Organisational communication: approaches and processes*. Boston, Mass: Wadsworth Centage Learning.

Moon, J.A. (2013). *Reflection in learning and professional development: Theory and Practice*. Hoboken: Taylor and Francis.

Mosser, G. (2014). *Understanding teamwork in health care*. New York: McGraw-Hill.

Runciman, B., Merry, A., and Walton, M. (2007). *Safety and ethics in healthcare: a guide to getting it right*. Aldershot, England: Ashgate.

Pitts, J. (2007). *Portfolios, personal development and reflective practice*. Edinburgh: ASME.

Skovholt, T.M. (2014). *The resilient practitioner: Burnout prevention and self-care strategies for counsellors, therapists, teachers and health professionals*. Pearson: Allyn & Bacon. (eBook)

Tarrant, P. (2013). *Reflective practice and professional development*. London : SAGE.

Wicks, R.J. (2005). *Overcoming secondary stress in medical and nursing practice: a guide to professional resilience and personal well-being*. New York: Oxford University Press.

Wicks, R.J. (2007). *The Resilient Clinician*. Oxford: Oxford University Press, USA.

RADT314 Radiation Therapy and Oncology III

Paper Code	RADT314
Date	January 2018
Duration	75 Contact and 100 independent learning hours
Points	14
Aim	To enable the student to integrate their knowledge of oncology and treatment modalities to determine optimal treatment for malignant disease and to understand the implications of resource management
Recommended Entry Level	Successful completion of RADT215: Radiation Therapy and Oncology II

Learning outcomes

On completion of this paper the successful student will be able to:

1. discuss the oncology of and the clinical rationale for selecting appropriate treatment for the stated 'Site List' (tumours that are commonly treated clinically);
2. analyse the resource implications of managing an oncology department.

Content:

Corresponding to Learning Outcome 1

Site List:

- breast
 - lung
 - head & neck (oral cavity, pharynx, parotid)
 - CNS (astrocytoma/medulloblastoma)
 - lymphoma (Hodgkins and non-Hodgkins lymphomas)
 - sarcomas
 - paediatrics
- a) Patient assessment methods
 - b) Tumour pathology and characteristics
 - c) Combined modality treatments with a focus on radiation therapy techniques (including palliation)
 - d) Typical treatment reactions and the appropriate management of these

Corresponding to Learning Outcome 2

- a) Human resource management
- b) Financial resource management
- c) Time management
- d) Equipment/plant/stock/management
- e) Use of statistics in management

Suggested Learning and Teaching Approaches

The learning outcomes of this paper could be achieved by the following:

- student centred tutorials with an emphasis on class discussion and debate;
- seminar and project presentations;
- the use of media such as VERT, videos, journals, texts, newspaper articles and television documentaries will provide a rich source of material for discussion, and exploration.

Assessment of Learning Outcomes

Summative assessment will consist of the following:

- test = 30% of total mark
- assignment = 30% of total mark
- final 2 hour written examination = 40% of total mark

50% must be gained in the coursework to be eligible to take the final examination.

A pass will be awarded to all students who gain 50% minimum in the examination and 50% overall.

Reporting Results to Students

Results will be reported to students as follows:

Coursework	60
Final examination	40
TOTAL	100

Student result notices will carry grades from A to E.

Resources

Barrett, A., Dobbs, J., Morris, S., & Roques, T. (2009). *Practical Radiotherapy Planning*. (4th Edition). London: Hodder education

Bomford, C.K. & Kunkler, I.H. (2003). *Walter & Miller's Textbook of radiotherapy: radiation, physics, therapy and oncology*. (6th Edition). Edinburgh: Churchill Livingstone.

Bryant, B., & Knights K. (2007). *Pharmacology for Health Professionals* (2nd Edition). Sydney: Mosby Elsevier.

Hass, M.L., Hogle, W.P., Moore-Higgs, G.J. & Gosselin-Acomb, T.K. (2007). *Radiation Therapy: A guide to patient care*. St Louis: Mosby Elsevier.

International Commission on Radiation Units and Measurements: (1993) Prescribing, Recording, and Reporting Photon Beam Therapy. (ICRU Report 50)

International Commission on Radiation Units and Measurements: (1999) Prescribing, Recording, and Reporting Photon Beam Therapy. Supplement to ICRU 50 (ICRU Report 62).

Lu, J.J & Brady, L.W. (Eds.). (2011). *Decision making in radiation oncology Vol 1 & Vol 2*. Berlin: Springer.

Moller, T.B. & Reif, E. (2006). *Pocket Atlas of Sectional Anatomy, CT and MRI, Vol 1 & Vol 2*. (3rd Edition). Thieme: New York.

Tortora, G.J. & Derrickson, B. (2009). *Principles of Anatomy and Physiology*. (12th Edition). John Wiley & Sons.

Washington, C.M. & Leaver, D.T. (2010). *Principles and Practice of Radiation Therapy*. (3rd Edition). Mosby, St Louis, Missouri.

Webber, E.C., Vilensky, J.A. & Carmichael, S.W. (2009). *Netter's Concise Radiologic Anatomy*. Saunders, an imprint of Elsevier Inc.

RADT315 Radiation Therapy Planning Concepts III

Paper Code	RADT315
Date	January 2018
Duration	91 Contact and 184 independent learning hours
Points	22
Aim	To enable students to understand the concepts of radiation therapy treatment planning to plan a range of techniques
Recommended Entry Level	Successful completion of RADT215: Radiation Therapy and Oncology II and RADT216: Radiation Therapy Planning Concepts I

Learning outcomes

On completion of this paper the successful student will be able to demonstrate:

1. knowledge and application of calculations used in radiation therapy;
2. knowledge and performance of principles and concepts of computer planning, and the ability to critically analyse standard radiation therapy technique computer plans
3. consolidation of imaging and anatomy relevant to radiation therapy
4. application of radiobiology to the clinical setting
5. demonstrate an understanding of IMRT and VMAT planning

Content:

Corresponding to Learning Outcome 1

- a) Calibration conditions
- b) Inverse square law
- c) Attenuation factors for SSD and SAD techniques
- d) Manual calculations of basic radiation therapy SSD and SAD treatment techniques including shielding and extended SSD
- e) Justification and understanding of factors used and resulting MU

Corresponding to Learning Outcome 2

- a) Apply computer planning principles and concepts to produce a range of plans of moderate difficulty. Principles to include:
 - isodose distributions
 - ICRU 50/62
 - normalisation
 - weighting
 - beam energy, d-max, exit dose and arrangement
 - beam arrangement
 - inhomogeneities
 - wedges
 - monitor units
 - field verification
 - organs at risk
 - diagnostic imaging
- b) Apply computer planning principles and concepts to critique standard radiation therapy technique computer plans

Corresponding to Learning Outcome 3

- a) Applied Anatomy

- b) Cone beam and kV imaging
- c) Application of CT, SPECT, PET, MRI

Corresponding to Learning Outcome 4

- a) Radiobiological principles
- b) Carcinogenesis, mutations
- c) Teratogenesis, radio-protection
- d) Acute whole body radiation syndromes
- e) Acute radiation reactions
- f) Late radiation reactions
- g) Tissue tolerance and scoring
- h) Chemoradiation
- i) Application of alpha/beta, managing gaps

Corresponding to Learning Outcome 5

- a) Apply computer planning principles and concepts to produce a range of plans.
Principles to include:
 - Inverse planning and optimisation
 - ICRU 83
 - Beam angle selection
 - DVH interpretation
 - Organs at risk
 - Beam energy, exit dose
 - Imaging
 - Verification and quality assurance
 - Monitor units

Suggested Learning and Teaching Approaches

The learning outcomes of this paper could be achieved by the following:

- practical laboratory tutorials for computer planning
- student centred tutorials with an emphasis on class discussion and debate
- the use of media such as videos, journals, and texts, will provide a rich source of material for discussion, and exploration;

Assessment of Learning Outcomes

Summative assessment will consist of the following:

- assignment = 40% of total mark
- radiobiology test = 20% of total mark
- viva (67% pass mark) = 40% of total mark

A pass will be awarded to all students who gain 50% minimum overall.

Reassessment

- one reassessment can occur if the pass mark of 67% is not achieved in the dosimetry viva;
- any student requiring a viva reassessment will only be able to gain a final minimum pass mark of 67%.

Reporting Results to Students

Results will be reported to students as follows:

Coursework	100
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Student result notices will carry grades from A to E.

Resources

Eclipse™ Treatment Planning System

Barrett, A., Dobbs, J., Morris, S., & Roques, T. (2009). *Practical Radiotherapy Planning*. (4th ed.) London: Hodder education

Bomford, C.K. & Kunkler, I.H. (2003) *Walter and Miller's Textbook of radiotherapy : radiation, physics, therapy and oncology*. (7th ed. 2012) Edinburgh, Churchill Livingstone.

Bushberg, J. T. (2002) *The essential physics of medical imaging*. (3rd ed. 2012) Philadelphia, Pa.; London : Lippincott Williams & Wilkins.

Giancoli, D.C. (2005). *Physics - Principles with Applications*. (7th ed. 2015) Prentice Hall, USA.

Hass, M.L., Hogle, W.P., Moore-Higgs, G.J. & Gosselin-Acomb, T.K. (2007). *Radiation Therapy: A guide to patient care*. Mosby Elsevier, St Louis.

Hendee, W. & Ritenour R. (2002). *Medical imaging physics*. New York ; Chichester : Wiley-Liss,

International Commission on Radiation Units and Measurements: (1993) *Prescribing, Recording, and Reporting Photon Beam Therapy*. (ICRU Report 50)

International Commission on Radiation Units and Measurements: (1999) *Prescribing, Recording, and Reporting Photon Beam Therapy*. Supplement to ICRU 50 (ICRU Report 62).

International Commission on Radiation Units and Measurements: (2010) *Prescribing, Recording, and Reporting Photon Beam Intensity-Modulated Radiation Therapy (IMRT)* (ICRU Report 83)

Khan, F. (2003). *The Physics of Radiation Therapy*. (5th ed. 2014) Williams and Wilkins, Baltimore.

Moller, T.B. & Reif, E. (2006). *Pocket Atlas of Sectional Anatomy, CT and MRI, Vol 1 & Vol 2*. (4th ed.2013). Thieme, New York.

Morris, S. (2001). *Radiotherapy physics and equipment*. Churchill Livingstone.

Purdy, J A. (2001) *3-D conformal and intensity modulated radiation therapy : physics & clinical applications*. Madison, WI, U.S.A. Advanced Medical Pub.

Stanton, R., & Stinton, D. (1992). *An Introduction to Radiation Oncology Physics*. Medical Physics Publishing.

Washington, C.M. & Leaver, D.T. (2016). *Principles and Practice of Radiation Therapy*. (4th Edition). Mosby, St Louis, Missouri.

Webber, E.C., Vilensky, J.A. & Carmichael, S.W. (2009). *Netter's Concise Radiologic Anatomy*. (2nd ed. 2014) Saunders, an imprint of Elsevier Inc.



W E L L I N G T O N

Bachelor of Radiation Therapy Curriculum Document 2018

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