

Postgraduate Diploma in Health Sciences in Magnetic Resonance Imaging (MRI)

Introduction

The Postgraduate Diploma in Health Sciences (MRI) provides a combination of academic and clinical elements signifying the importance of ensuring graduates from this programme will be eligible for registration with the regulatory body, the New Zealand Medical Radiation Technologists Board (MRTB), in the MRI scope of practice. The MRTB requires education providers to ensure that graduates have a sound knowledge and skills base to practise as an MRI Technologist safely and effectively by meeting the criteria for competence in MRI, as set out in the Board's competency documents.

Programme Overview

The specialisations in the Postgraduate Diploma in Health Sciences consist of 120 points of taught coursework (eight 15-point courses) and can be completed in between two and four years of part-time study. Students will be expected to spend approximately 150 hours of study for each 15-point course. In specialisations with a clinical requirement (such as MRI) students will be required to complete a minimum of 2000 hours of clinical practice by programme completion.

All courses will be delivered fully online, with the possible exception of the elective course being dependent on the student's choice. In addition, a small number of courses offer the opportunity for students to visit the University's Grafton campus for 1-2 days to complement their learning. While highly recommended, attendance at these on-campus block courses is not compulsory.

Each student is required to complete eight 15-point courses of which seven are compulsory (105 points); 30 points (two courses) being common to all Medical Imaging specialisations and 75 points (five courses) specific to the MRI specialisation.

Students are also required to complete either an [Approved Research Methods Course](#), of which a range is available dependent on experience and interest, or an elective course selected from the [Master of Health Sciences Schedule](#) (including all courses from the Medical Imaging programmes). For MRI students, the course **MEDIMAGE 721: MRI Safety** is highly recommended as the elective choice (this course is delivered in semester one).

Schedule of courses:

Postgraduate Diploma in Health Sciences in Magnetic Resonance Imaging (MRI)

Course Code	Course Name	Semester 1	Semester 2
MEDIMAGE 701	Imaging Anatomy and Pathology	✓	✓
MEDIMAGE 702	Professional Issues in Medical Imaging	✓	✓
MEDIMAGE 714	Fundamentals of Clinical MRI*	✓	✓
MEDIMAGE 715	MRI Technology		✓
MEDIMAGE 721	MRI Safety (<i>elective</i>)	✓	
CLINIMAG 710	MRI Clinical Applications	✓	
CLINIMAG 711	MRI Specialised Clinical Applications		✓
CLINIMAG 712	MRI Clinical Practice	✓	✓

*As this course is a pre-requisite for all of the other MRI-specific courses, it is expected that students complete this in the first semester of their programme of study

Course Outlines

MEDIMAGE 701: Imaging Anatomy and Pathology

15 Points

Students will develop an integrated understanding of anatomy and pathology as it applies to Medical Imaging in the clinical context. The course introduces the principles of medical science at whole body, organ, tissue, cellular and sub cellular levels and includes the fundamentals of anatomy, physiology and pathophysiology of the major systems of the human body in relation to specific regions and pathologies.

Objectives of the course

This course aims to enhance the student's clinical reasoning skills and to enable them to evaluate the use of a variety of imaging modalities in patient diagnosis and management. It will extend students' overall professional competence through an academically applied level of understanding of clinical science. Anatomical knowledge of various systems and associated pathological processes will be developed, linked to their functional and clinical relevance.

Learning outcomes

1. Demonstrate a comprehensive understanding of normal anatomy and selected pathological processes by explaining the clinical course of a disease/injury using supporting images from a range of imaging modalities.
2. Evaluate the advantages and limitations of a range of imaging modalities when applied to the investigation of specific pathologies.
3. Critically examine strategies for the selection of appropriate imaging modalities as part of the diagnostic, management and/or treatment pathway.

MEDIMAGE 702: Professional Issues in Medical Imaging

15 Points

Students will investigate the concept of professional practice leading to an exploration of current professional issues relevant to Medical Imaging including role development and advanced practice. The course will provide students with the knowledge to interact with individuals from a variety of backgrounds both ethically and with respect for their beliefs and values. The course also addresses medico-legal issues, decision-making and effective communication within the clinical setting.

Objectives of the course

This course aims to provide students with the ability to respond to the wide variety of professional, ethical, medico-legal and clinical workplace issues generated in a rapidly changing environment. Students will develop an awareness of personal, professional and interpersonal expertise thereby enabling them to reflect on their own clinical practice related to these issues in the context of fitness to practise.

Learning outcomes

1. Critically evaluate the development and evolution of Medical Imaging as a profession and its place within the healthcare system.
2. Examine how communication, interpersonal and inter-professional dynamics impact on your role as a Medical Imaging practitioner.
3. Reflect on the role of critical thinking and reflective practice in the context of your clinical practice.
4. Critically examine a broad range of ethical and medico-legal issues relevant to professional and cultural competence within Medical Imaging practice.

5. Analyse the processes of clinical decision making and professional judgement, including the concept of autonomous practice.
6. Compare and contrast Medical Imaging role development in New Zealand and the progression of advanced practice within Medical Imaging and other healthcare professions.
7. Define fitness to practice in Medical Imaging by critically reflecting on each of the above topics within your clinical practice.

MEDIMAGE 714: Fundamentals of Clinical MRI

15 Points

Provides a fundamental understanding of MRI technology and applications and addresses scientific principles of the modality including resonance and relaxation, image contrast, spatial encoding and digital image formation. Students will examine components of the clinical environment including MRI equipment, contrast agents, bio-effects and safety. In addition, students will analyse standard imaging protocols of the lumbar spine, knee and brain and normal and abnormal MR imaging appearances of these areas.

Objectives of the course

This course aims to provide students with specialised theoretical knowledge and an understanding of the fundamental physical principles of MR technology. The student will develop the ability to apply this knowledge in the safe use of MRI equipment for clinical and/or research purposes. In particular, this course will investigate common pathologies and the use of standard protocols in relation to a selection of common MR imaging applications.

Learning outcomes

1. Demonstrate an understanding of theoretical concepts relating to MR technology.
2. Critically discuss specific issues relating to bio-effects and safety within the MR environment.
3. Differentiate and explain normal and altered MR imaging appearances of the lumbar spine, knee and brain.
4. Make informed clinical judgements with regard to the selection of standard imaging protocols and technical parameters in relation to the lumbar spine, knee and brain.
5. Apply an evidence-based approach to clinical decision-making and problem solving.

MEDIMAGE 715: MRI Technology

15 Points

Provides an in-depth understanding of MRI technology and its applications and addresses scientific principles of the modality relating to standard clinical practice including pulse sequences, image quality and quality assurance, technical parameters and trade-offs, image optimisation, artefacts, parallel imaging, scanning at 3T, diffusion and MR angiography.

Prerequisite: MEDIMAGE 714

Objectives of the course

This course aims to extend students' specialised theoretical knowledge and understanding of the underlying scientific principles of MR technology. The student will develop the ability to apply this knowledge to obtain images of optimal diagnostic quality.

Learning outcomes

1. Analyse the underlying physical principles of a range of MRI pulse sequences in order to manipulate factors appropriately and to demonstrate an understanding of their application to practice.
2. Analyse and integrate the principles and technology of MRI to enable image optimisation.
3. Critically evaluate the technical and diagnostic quality of a range of MR images.

4. Evaluate the importance of quality assurance and explain the associated impact on safety and image quality.
5. Critically discuss current developments in MR technology and assess the impact on clinical practice.

MEDIMAGE 721: MRI Safety (elective)

15 Points

Extends students' understanding of the underlying physical principles related to a range of MRI safety issues. The course will provide students with the opportunity to explore these safety issues in detail and to apply this knowledge in critically evaluating current policies and practices. New and emerging safety topics will also be examined.

Prerequisite: MEDIMAGE 714

Objectives of the course

This course aims to extend students' theoretical knowledge underpinning MRI safety issues. Students will further develop their ability to contribute confidently to the clinical decision-making process when encountering safety issues in the MRI environment.

Learning outcomes

1. Apply a clinical decision-making framework to a range of clinical MRI safety scenarios.
2. Discuss the roles and responsibilities of various staff in relation to maintaining a safe MRI environment.
3. Critically evaluate MRI safety practices, justifying or suggesting modifications to these practices based on current literature.
4. Discuss emerging safety issues and assess their potential impact on current clinical practice.

CLINIMAG 710: MRI Clinical Applications

15 Points

Addresses normal and abnormal imaging appearances, protocol selection and development, and applications associated with standard neurological, musculoskeletal and body MRI examinations.

Prerequisite: MEDIMAGE 714

Objectives of the course

This course aims to cultivate a critically questioning approach to MR imaging practice. An emphasis will be placed on integrating theory and clinical practice elements in order to facilitate clinical competence. The course will expect students to assimilate the underlying physical principles of MRI with relevant biological processes and imaging appearances.

Learning outcomes

1. Differentiate and explain normal and abnormal MR imaging appearances of the head, neck, spine, abdomen, pelvis and musculoskeletal system.
2. Make informed clinical judgements with regard to the selection of imaging protocols and technical parameters in relation to the head, neck, spine, abdomen, pelvis and musculoskeletal system.
3. Develop appropriate imaging protocols for specific pathologies of the head, neck, spine, abdomen, pelvis, and musculoskeletal system applications.
4. Critically evaluate a range of standard MRI techniques to investigate specific regions and pathologies.
5. Apply an evidence-based approach to clinical decision-making and problem solving.

CLINIMAG 711: MRI Specialised Clinical Applications

15 Points

Addresses complex scientific principles of MRI relevant to a range of specialised applications. Students will examine advanced pulse sequences, and specialised procedures including breast

MR, enterography, MR angiography, functional MRI and cardiac MRI. Techniques such as perfusion, spectroscopy, diffusion tensor imaging (DTI) and tractography will be investigated in addition to new and evolving techniques.

Prerequisite: MEDIMAGE 714

Objectives of the course

This course aims to provide students with specialised theoretical knowledge and an understanding of the more complex scientific principles of MR technology. Students will continue to cultivate a critically questioning approach to MR imaging practice with an emphasis on integrating theory and clinical practice elements in order to facilitate clinical competence.

Learning outcomes

1. Analyse the underlying physical principles of a range of advanced techniques in order to manipulate factors appropriately and to demonstrate an understanding of their application to clinical practice and/or research.
2. Make informed clinical judgements on the selection of imaging protocols and technical parameters for a range of specialised MRI applications.
3. Critically evaluate a range of advanced MRI techniques to investigate specific anatomical regions, physiological processes and pathologies.
4. Critically discuss current developments in MRI applications and explore literature in relation to emerging initiatives.

CLINIMAG 712: MRI Clinical Practice

15 Points

Develops the knowledge, competencies, skills and attitudes needed to demonstrate mastery in both academic and professional capability in MRI practice.

Prerequisite: 90 points and departmental approval required

Objectives of the course

This course enables the student to provide evidence of their clinical competence while emphasising the importance of synthesising theory and clinical practice elements. Students will evaluate their own clinical practice specifically relating to the core competencies of communication, professionalism, holistic patient care, maintenance of safe practices, ability to operate equipment, knowledge of imaging requirements, ability to produce appropriate diagnostic images, application of management principles, quality service management, and engagement in research and professional development. In particular, this course will promote higher level professional and reflective skills in the student.

Learning outcomes

1. Apply an evidence-based approach to clinical decision-making and problem solving.
2. Demonstrate the ability to reflect critically on a wide variety of aspects within clinical practice.
3. Demonstrate accountability and personal insight in relation to students' own clinical practice.
4. Demonstrate clinical competence in performing a wide range of MRI examinations.

Clinical Learning and Assessment

Development of the practitioner's clinical practice is a vital part of the University's programmes. For this to be possible, it is necessary for students to carry out a sufficient number and range of examinations in a clinical setting. This will assist students to progress their clinical decision-making skills in practice and subsequently to achieve the minimum clinical competency standards as prescribed by the Medical Radiation Technologists Board (MRTB).

In order to facilitate integration of academic knowledge with applied clinical practice, it is essential that a supportive learning environment is encouraged within the workplace and the University will work with clinical partners to achieve this. The University will require that students are supervised by an appropriately qualified MRI Technologist. This person will contribute to the assessment of students to ensure their performance and knowledge is at the required level.

Within the Medical Imaging courses, students will complete a range of assessments designed to develop and assess academic development as well as assessment to attest to clinical competence. In the MRI Clinical Practice course, students will be required to demonstrate clinical competence before a passing grade may be awarded. Students will not be able to compensate an inadequate clinical assessment with excellent academic work.

Workplace-Based Clinical Competency Assessment

Assessment of clinical competency will occur in the workplace throughout the duration of the student's enrolment within this programme. Failure to demonstrate a minimum level of competency at specific time points may indicate a fitness to practise issue consequently resulting in the student being unable to proceed in the programme until a remediation plan is implemented and successfully completed.

To facilitate learning within a clinical setting, students will receive access to an electronic clinical portfolio in which they will record and accumulate both formative and summative evidence of clinical learning. They will also be expected to record reflections on incidents and events that occur within their clinical practice.

The clinical portfolio will contain an electronic log of examinations that are observed or performed along with a record of workplace-based assessments. As the students proceed through their programme of study they will be given feedback on their clinical portfolio.

1. Electronic Logbook (eLogbook)

The student is required to complete an electronic record of a specified number and range of examinations that they observe, perform with assistance, or perform independently, with verification by the Clinical Supervisor. If it is not possible for a single workplace to provide the required minimum number and range of examinations, it will be the responsibility of the student's manager to ensure the student is able to meet these requirements elsewhere. For example, it may be necessary to arrange for the student to visit another department to perform or observe examinations.

2. Quarterly Progress Reports (QPR)

Quarterly progress meetings between the Clinical Supervisor and student will take place with a report being submitted. The most important function of these meetings is to provide constructive, effective feedback to the student on their progress to date and to identify any issues or concerns.

3. Longitudinal Evaluation of Performance (LEP)

This assessment involves a student performing a range of clinical examinations within their own workplace. A prescribed minimum number of LEP assessments will be completed by the Clinical Supervisor over the duration of the student's enrolment in the MRI programme. In addition, other appropriately qualified assessors within the workplace are encouraged to perform these assessments. Online training for Clinical Supervisors and Clinical Assessors is provided by the University of Auckland.

4. Multi-source feedback (MSF)

Questionnaires will be distributed to several groups; peers, patients, radiologists, clerical staff and inter-professional colleagues where appropriate. This form of assessment is used to evaluate attributes such as communication skills, team-working, professionalism, patient care and personal insight. The Clinical Supervisor will be responsible for distribution and collection of these.

5. Structured Observation and Assessment of Practice (SOAP)

The SOAP is the final clinical assessment of competency and is performed by the Clinical Supervisor and a University of Auckland assessor who visits the student's workplace to observe the student engaged in their usual clinical activities.

Conclusion

Learning and teaching at the University of Auckland is informed by education theories and research-led. Students are encouraged to learn collaboratively, learning with and from their peers and the academic teaching team. The focus is not just on acquiring new knowledge. While the acquisition of new knowledge is seen as an essential part of postgraduate education, equally important is the development of clinical competence, critical thinking and reflective learning; essential attributes for modern healthcare practitioners.

Disclaimer: Although every reasonable effort is made to ensure accuracy, the information in this document is provided as a general guide only and is subject to alteration.