

Postgraduate Diploma in Health Sciences in Ultrasound

Introduction

The Postgraduate Diploma in Health Sciences (Ultrasound) 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 ultrasound scope of practice. The MRTB requires education providers to ensure that graduates have a sound knowledge and skills base to practise as a sonographer safely and effectively by meeting the criteria for competence in ultrasound, 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 ultrasound) 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 exception of the optional course 'CLINIMAG 709: Principles of Clinical Ultrasound' which requires full-time on-campus attendance for 12 weeks.

Each student is required to complete eight 15-point courses, all of which are compulsory (120 points); 30 points (two courses) being common to all Medical Imaging specialisations and 90 points (six courses) specific to the ultrasound specialisation.

Schedule of courses: Postgraduate Diploma in Health Sciences in Ultrasound

Course Code	Course Name	Semester 1	Semester 2
MEDIMAGE 701	Imaging Anatomy and Pathology	✓	✓
MEDIMAGE 702	Professional Issues in Medical Imaging	✓	✓
MEDIMAGE 716	Fundamentals of Clinical Ultrasound*	✓	✓
MEDIMAGE 717	Ultrasound Imaging Technology	✓	
CLINIMAG 709 OR	Principles of Clinical Ultrasound OR	✓	✓
CLINIMAG 719	Ultrasound Abdominal Clinical Applications		✓
CLINIMAG 713	Ultrasound Clinical Applications: Obstetrics and Gynaecology		✓
CLINIMAG 720	Ultrasound Specialised Clinical Applications	✓	
CLINIMAG 715	Ultrasound Clinical Practice	✓	✓

**As this course is a pre-requisite for all of the other ultrasound-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 practise in Medical Imaging by critically reflecting on each of the above topics within your clinical practice.

MEDIMAGE 716: Fundamentals of Clinical Ultrasound

15 Points

Provides a fundamental understanding of ultrasound technology and applications. Students will examine components of the clinical environment including transducer

technology, quality assurance, bio-effects and safety. In addition, students will analyse standard imaging techniques and normal and abnormal imaging appearances of the renal tract, pelvis and first trimester of pregnancy.

Objectives of the course

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

Learning outcomes

1. Demonstrate an understanding of theoretical concepts relating to ultrasound technology.
2. Demonstrate an understanding of theoretical and clinical concepts relating to human embryology.
3. Critically discuss specific issues relating to bio-effects and safety within the ultrasound environment.
4. Differentiate and explain normal and altered ultrasound imaging appearances of the renal tract, pelvis and first trimester of pregnancy.
5. Make informed clinical judgements with regard to the selection of appropriate scanning techniques and technical parameters for ultrasound imaging of the renal tract, pelvis and first trimester of pregnancy.
6. Apply an evidence-based approach to clinical decision-making and problem solving.

MEDIMAGE 717: Ultrasound Imaging Technology

15 Points

Provides students with the advanced scientific principles of ultrasound and their application. The course addresses Doppler principles, artefacts and instrumentation, electronic array technology, contrast agents, three dimensional and 4-D scanning, equipment developments and new and evolving techniques.

Prerequisite: MEDIMAGE 716

Objectives of the course

This course aims to extend students' specialised theoretical knowledge and understanding of the underlying scientific principles of ultrasound 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 advanced techniques 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 ultrasound to enable image optimisation.
3. Critically evaluate the technical and diagnostic quality of a range of ultrasound images.
4. Evaluate the importance of quality assurance and explain the associated impact on safety and image quality.
5. Critically discuss current developments in ultrasound technology and assess the impact on clinical practice.

CLINIMAG 709: Principles of Clinical Ultrasound

15 Points

Provides a fundamental understanding of ultrasound technology and applications. Students will examine components of the clinical environment including transducer technology, quality assurance, bio-effects and safety, and apply these to clinical practice.

In addition, students will analyse standard imaging techniques, normal and abnormal imaging appearances of the abdomen, pelvis and lower leg veins and perform examinations of these areas.

Prerequisite or Corequisite: MEDIMAGE 716

Objectives of the course

This course aims to provide students with specialised theoretical knowledge and an understanding of the fundamental physical principles of ultrasound. The student will develop the ability to apply this knowledge in the safe use of ultrasound equipment for clinical and/or research purposes. In particular, this course will investigate common pathologies and the use of standard sonography imaging techniques in relation to a selection of common ultrasound applications. In addition, the course aims to develop clinical competence that is expected of a trainee sonographer during the initial phase of clinical training. The emphasis is on the synthesis of theory and clinical practice with the aim of developing a reflective sonography trainee, who will be well prepared to perform ultrasound scanning under supervision.

Learning outcomes

1. Demonstrate an understanding of theoretical concepts relating to ultrasound technology.
2. Critically discuss specific issues relating to bio-effects and safety within the ultrasound environment.
3. Differentiate and explain normal and altered ultrasound imaging appearances of the abdomen, pelvis and lower leg veins.
4. Make informed clinical judgements with regard to the selection of appropriate scanning techniques and technical parameters for ultrasound imaging of the abdomen, pelvis, and lower leg veins.
5. Apply an evidence-based approach to clinical decision-making and problem solving.
6. Demonstrate professionalism and appropriate levels of communication with patients during sonography imaging.
7. Demonstrate clinical competence of a trainee sonographer in performing basic ultrasound examinations of the abdomen, pelvis and lower leg veins.

CLINIMAG 719: Ultrasound Abdominal Clinical Applications

15 Points

Addresses normal and abnormal ultrasound imaging appearances, scanning techniques and applications associated with abdominal ultrasound examinations. An emphasis will be placed on integrating theory and clinical practice elements to facilitate sound clinical decision making and clinical competence.

Prerequisite: MEDIMAGE 716

Objectives of the course

This course aims to cultivate a critically questioning approach to ultrasound 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 ultrasound with relevant biological processes and imaging appearances.

Learning outcomes

1. Differentiate and explain normal and abnormal appearances of the abdomen on ultrasound images.
2. Make informed clinical decisions with regard to the selection of appropriate scanning techniques and technical parameters in relation to the abdomen.
3. Develop appropriate scanning techniques for abdominal applications.
4. Critically evaluate a broad range of both standard and advanced ultrasound applications to investigate specific regions and pathologies of the abdomen.

5. Apply an evidence-based approach to clinical decision-making and problem solving.

CLINIMAG 713: Ultrasound Clinical Applications in Obstetrics and Gynaecology

15 Points

Addresses normal and abnormal ultrasound imaging appearances, in addition to adaptation of scanning techniques relating to gynaecology and obstetrics ultrasound imaging.

Prerequisite: MEDIMAGE 716

Objectives of the course

This course aims to cultivate a critically questioning approach to ultrasound 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 ultrasound with relevant biological processes and imaging appearances.

Learning outcomes

1. Differentiate and explain normal and abnormal appearances on ultrasound images related to gynaecology and obstetrics.
2. Make informed clinical judgements with regard to the selection of appropriate scanning techniques and technical parameters for a range of gynaecology and obstetrics examinations.
3. Develop appropriate scanning techniques for gynaecology and obstetrics applications.
4. Critically evaluate a broad range of both standard and advanced ultrasound applications to investigate specific regions and pathologies related to gynaecology and obstetrics.
5. Apply an evidence-based approach to clinical decision-making and problem solving.

CLINIMAG 720: Ultrasound Specialised Clinical Applications

15 Points

Addresses normal and abnormal ultrasound imaging appearances, scanning techniques and applications associated with musculoskeletal, vascular, small parts and paediatric ultrasound examinations. An emphasis will be placed on integrating theory and clinical practice elements to facilitate sound clinical decision making and clinical competence.

Prerequisite: MEDIMAGE 716

Objectives of the course

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

Learning outcomes

1. Differentiate and explain normal and abnormal appearances of the musculoskeletal system, vascular system, small parts and paediatric imaging on ultrasound images.
2. Make informed clinical decisions with regard to the selection of appropriate scanning techniques and technical parameters in relation to the musculoskeletal system, vascular system, small parts and paediatric imaging.
3. Develop appropriate scanning techniques for musculoskeletal system, vascular system, small parts and paediatric applications.
4. Critically evaluate a broad range of both standard and advanced ultrasound applications to investigate specific regions and pathologies of the musculoskeletal system, vascular system, small parts and paediatric applications.
5. Apply an evidence-based approach to clinical decision-making and problem solving.

CLINIMAG 715: Ultrasound Clinical Practice

15 Points

Develops the knowledge, competencies, skills and attitudes needed to demonstrate mastery in both academic and professional capability in ultrasound 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 ultrasound 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 sonographer. 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 Ultrasound 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 ePortfolio 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 ePortfolio 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 ePortfolio.

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 ultrasound 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.