Postgraduate Diploma in Health Sciences in Medical Imaging (Ultrasound Pathway)

Introduction
The Ultrasound pathway of the Postgraduate Diploma in Health Sciences (Medical Imaging) provides an opportunity for Medical Imaging Technologists/radiographers to extend their professional knowledge enabling them to adapt to and contribute confidently within a rapidly changing health care environment.

Note: This pathway is intended for international students who want to study the theoretical aspects of ultrasound. As there is no clinical competency assessment included in this pathway, graduates from this programme will NOT be eligible for registration with the regulatory body, the New Zealand Medical Radiation Technologists Board (MRTB), in the ultrasound scope of practice.

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. All courses will be delivered fully online.

Each student is required to complete eight 15-point courses of which six are compulsory (90 points); 30 points (two courses) being common to all Medical Imaging specialisations and 75 points (five courses) specific to the ultrasound specialisation.

Students are also required to complete both an Approved Research Methods Course, of which a range is available dependent on experience and interest.

Schedule of courses:
Postgraduate Diploma in Health Sciences in Medical Imaging (Ultrasound pathway)

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*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 evolvement 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  
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  
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 719: Ultrasound Abdominal Clinical Applications**

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.

*Department consent is required for enrolment to this course therefore a concession request must be submitted including a description of the student’s experience in clinical ultrasound scanning.

**CLINIMAG 713: Ultrasound Clinical Applications in Obstetrics and Gynaecology**

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.
*Department consent is required for enrolment to this course therefore a concession request must be submitted including a description of the student’s experience in clinical ultrasound scanning.

**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.

*Department consent is required for enrolment to this course therefore a concession request must be submitted including a description of the student's experience in clinical ultrasound scanning.

**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.