

**MRSC2501: Medical Radiation Science Instrumentation IIA**

Callaghan

Semester 1 - 2024



**COURSE OUTLINE**

**OVERVIEW**

<b>Course Description</b>	This course presents to medical radiation science students the basic principles of operation of technology that produces medical images, from a variety of modalities that can be used in either the diagnosis or treatment of disease. This course allows students to better understand, and provide a safe work environment, when using instrumentation associated with their clinical placements.
<b>Academic Progress Requirements</b>	Nil
<b>Requisites</b>	Students must have successfully completed PHYS1250 and be active in one of the following programs to enrol in this course: Bachelor of Medical Radiation Science (Honours) (Diagnostic Radiography) [40002], Bachelor of Medical Radiation Science (Honours) (Radiation Therapy) [40010], or Bachelor of Medical Radiation Science (Honours) (Nuclear Medicine) [40011].
<b>Assumed Knowledge</b>	MRSC1100 AND 1110, or MRSC1200 AND 1220, or MRSC1300 AND 1330, and PHYS1250
<b>Contact Hours</b>	<b>Callaghan</b> <b>Lecture</b> Face to Face On Campus 4 hour(s) per week(s) for 7 week(s)  <b>Tutorial</b> Face to Face On Campus 1 hour(s) per week(s) for 7 week(s)
<b>Unit Weighting Workload</b>	10 Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10-unit course.

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## CONTACTS

<b>Course Coordinator</b>	<b>Callaghan</b> Professor Peter Stanwell Peter.Stanwell@newcastle.edu.au (02) 4921 6586 Consultation: by appointment to be made via e-mail
<b>Teaching Staff</b>	Dr Joshua Williams ( <a href="mailto:joshua.s.williams@newcastle.edu.au">joshua.s.williams@newcastle.edu.au</a> ) Andrew Lloyd ( <a href="mailto:Andrew.lloyd@newcastle.edu.au">Andrew.lloyd@newcastle.edu.au</a> )
<b>School Office</b>	<b>School of Health Sciences</b> Room 302, ICT Building Callaghan SchoolHealthSciences@newcastle.edu.au +61 2 4921 7053

## SYLLABUS

<b>Course Content</b>	<b>1. POSITRON EMISSION TOMOGRAPHY - Andrew Lloyd</b> <ul style="list-style-type: none"><li>a. Basic principles of SPECT / PET</li><li>b. Design of SPECT / PET scanners</li><li>c. Image Acquisition</li><li>d. Image Reconstruction</li><li>e. PET/CT Scanners</li><li>f. Attenuation Correction</li></ul> <b>2. ULTRASOUND – Joshua Williams</b> <ul style="list-style-type: none"><li>a. Principles of ultrasound</li><li>b. Attenuation of ultrasound</li><li>c. Transducers in ultrasound</li><li>d. Pulse-echo instrumentation</li><li>e. Doppler instrumentation</li><li>f. Biological effects and safety</li></ul> <b>3. MAGNETIC RESONANCE IMAGING – Peter Stanwell</b> <ul style="list-style-type: none"><li>a. Basic principles of MRI</li><li>b. MR Magnets and Coils</li><li>c. Imaging with MRI</li><li>d. Artifacts in MRI</li><li>e. Hazards in MRI</li></ul>
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<b>Course Learning Outcomes</b>	<b>On successful completion of this course, students will be able to:</b> <ul style="list-style-type: none"><li>1. Describe basic SPECT/PET terminology</li><li>2. Explain the principles of imaging with SPECT/PET</li><li>3. Discuss the instrumentation used in SPECT/PET</li></ul>
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4. Discuss the benefits of PET/CT
5. Explain attenuation correction in PET
6. Describe basic Ultrasound terminology
7. Explain the principles of imaging using Ultrasound
8. Discuss the instrumentation used in Ultrasound
9. Discuss and describe the biological effects of Ultrasound in imaging
10. Describe basic Magnetic Resonance Imaging terminology
11. Explain the principles of imaging using Magnetic Resonance Imaging
12. Discuss the instrumentation used in Magnetic Resonance Imaging
13. Discuss and describe the safety aspects of Magnetic Resonance Imaging

**Course Materials** Course notes and recorded lectures will be available via the Canvas Course Site (MRSC2501)

## COMPULSORY REQUIREMENTS

In order to pass this course, each student must complete ALL of the following compulsory requirements:

### Contact Hour Requirements:

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### Course Assessment Requirements:

- Assessment 1 - Exam - class - Ultrasound: Submit assessment item - Must submit this assessment to pass the course.
- Assessment 2 - Exam - class - Magnetic Resonance Imaging: Submit assessment item - Must submit this assessment to pass the course.
- Assessment 3 - Exam - Class - PET & SPECT: Submit assessment item - Must submit this assessment to pass the course.
- Assessment 4 - MRI Safety: Submit assessment item - Must submit this assessment to pass the course.

- **To pass this course** you must obtain a minimum mark of 50% averaged over all assessments

### Compulsory Placement and WHS Requirements:

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## SCHEDULE

## ASSESSMENTS

This course has 4 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Exam - class - Ultrasound*	Tuesday, 19 <sup>th</sup> March at 4pm	Individual	20%	6, 7, 8, 9
2	Exam - class - Magnetic Resonance Imaging*	Wednesday, 3 <sup>rd</sup> April at 3pm	Individual	20%	10, 11, 12, 13
3	Exam - class - PET & SPECT*	Tuesday, 4 <sup>th</sup> June at 4pm	Individual	20%	1, 2, 3, 4, 5
4	MRI Safety*	Friday, 26 <sup>th</sup> April at 12 midday	Individual	40%	13

\* This assessment has a compulsory requirement.

### Late Submissions

The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

### Assessment 1 - Exam - class - Ultrasound

<b>Assessment Type</b>	In Term Test
<b>Description</b>	A series of MCQ and/or short answer questions
<b>Weighting</b>	20%
<b>Compulsory Requirements</b>	Submit assessment item - Must submit this assessment to pass the course.
<b>Due Date</b>	Tuesday, 19 <sup>th</sup> March at 4pm
<b>Submission Method</b>	Online examination via Canvas
<b>Assessment Criteria</b>	Grades published via Canvas Grade Book
<b>Return Method</b>	Not returned
<b>Feedback Provided</b>	An appointment can be made with the Course Coordinator to review your examination results on an individual basis
<b>Opportunity to Reattempt</b>	Students WILL NOT be given the opportunity to reattempt this assessment.

### Assessment 2 - Exam - class - Magnetic Resonance Imaging

<b>Assessment Type</b>	In Term Test
<b>Description</b>	A series of MCQ and/or short answer questions
<b>Weighting</b>	20%
<b>Compulsory Requirements</b>	Submit assessment item - Must submit this assessment to pass the course.
<b>Due Date</b>	Wednesday, 3 <sup>rd</sup> April at 3pm
<b>Submission Method</b>	Online examination via Canvas
<b>Assessment Criteria</b>	Grades published via Canvas Grade Book
<b>Return Method</b>	Not returned

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<b>Feedback Provided</b>	An appointment can be made with the Course Coordinator to review your examination results on an individual basis
<b>Opportunity to Reattempt</b>	Students WILL NOT be given the opportunity to reattempt this assessment.

### Assessment 3 - Exam - Class - PET & SPECT

<b>Assessment Type</b>	In Term Test
<b>Description</b>	A series of MCQ and/or short answer questions
<b>Weighting</b>	20%
<b>Compulsory Requirements</b>	Submit assessment item - Must submit this assessment to pass the course.
<b>Due Date</b>	Tuesday, 4 <sup>th</sup> June at 4pm
<b>Submission Method</b>	Online examination via Canvas
<b>Assessment Criteria</b>	Grades published via Canvas Grade Book
<b>Return Method</b>	Not returned
<b>Feedback Provided</b>	An appointment can be made with the Course Coordinator to review your examination results on an individual basis
<b>Opportunity to Reattempt</b>	Students WILL NOT be given the opportunity to reattempt this assessment.

### Assessment 4 - MRI Safety

<b>Assessment Type</b>	Written Assignment
<b>Description</b>	This assessment requires you to develop an evidence-based document that identifies an area of MRI Safety suitable for a competent MRS practitioner.
<b>Weighting</b>	40%
<b>Compulsory Requirements</b>	Submit assessment item - Must submit this assessment to pass the course.
<b>Due Date</b>	Friday, 26 <sup>th</sup> April at 12 midday ( <b>NB this occurs during Professional Placement</b> )
<b>Submission Method</b>	Electronic submission
<b>Assessment Criteria</b>	Grades published via Canvas Grade Book
<b>Return Method</b>	Not returned, comments available in Grade Centre in Canvas
<b>Feedback Provided</b>	An appointment can be made with the Course Coordinator to review your examination results on an individual basis
<b>Opportunity to Reattempt</b>	Students WILL NOT be given the opportunity to reattempt this assessment.

## ADDITIONAL INFORMATION

### Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction	Excellent standard indicating a very high level of knowledge

	(D)	and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

\*Skills are those identified for the purposes of assessment task(s).

**Communication Methods**

Communication methods used in this course include:

- Allocated time at the end of each lecture and/or tutorial
- Course related information will be communicated via e-mail sent from Canvas (please be sure to monitor your University email address)
- Personal related information can be communicated by making an appointment to meet the Course Coordinator

**Course Evaluation**

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

**Oral Interviews (Vivas)**

As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the [Oral Examination \(viva\) Procedure](#). In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the [Student Conduct Rule](#).

**Academic Misconduct**

All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to <https://policies.newcastle.edu.au/document/view-current.php?id=35>.

**Adverse Circumstances**

The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where:

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1. the assessment item is a major assessment item; or
  2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;
  3. you are requesting a change of placement; or
  4. the course has a compulsory attendance requirement.

Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at:

<https://policies.newcastle.edu.au/document/view-current.php?id=236>

**Important Policy  
Information**

The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at <https://www.newcastle.edu.au/current-students/respect-at-uni/policies-and-procedures> that support a safe and respectful environment at the University.

*This course outline was approved by the Head of School. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.*

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