MSc Medical Imaging Science 24/25

Description

MSc Medical Imaging Science

2024 â€“ 2025

Programme Handbook

General Information

Welcome!

Congratulations on being accepted in the MSc/Diploma in Medical Imaging Science. I hope that you will find your time in Manchester interesting and enjoyable. This programme handbook aims to provide you with generic and programme specific information that you will need to progress through the programme (with links to on-line resources).

If there is anything you would like to ask about the programme, the Programme Directors are Dr Marie-Claude Asselin (marie-claude.asselin@manchester.ac.uk) and Dr Adam McMahon (adam.mcmahon@manchester.ac.uk). Please donâ€™tâ€™ hesitate to contact us.

Useful Contacts

If you have any questions or encounter any problems during your studies, you can also contact a member of the Programme Support Team who will endeavour to deal with your query or re-direct it appropriately. If you have questions that relate to teaching materials or assessments in specific course units, then please contact the relevant unit lead from the list of teaching staff below.

Academic Staff

	Joint Programme Director Unit Lead: *Non-Isotope Imaging*	
Dr Marie-Claude Asselin	Unit Lead: *Quantitative Imaging Into Practice* (QIIP) Lecturer: *Scientific Skills*/Pharmacology, *Radioisotope Imaging*, *Advanced PET & MRI*	marie-claude.asselin@manchester.ac.uk
Dr Adam McMahon	Joint Programme Director Unit Lead: *Radioisotope Imaging* Lecturer: *Scientific Skills*/Chemistry	Adam.Mcmahon@manchester.ac.uk
Dr Richard Hodgson	Unit co-Lead: *Scientific Skills*/Human Biology Unit Lead: *Imaging in Clinical Diagnosis*	richard.hodgson@manchester.ac.uk
Prof. Tim Cootes	Unit Lead: *Mathematical Foundations of Imaging* Unit Lead: *Mathematical Computing for Medical Imaging* Lecturer: *Scientific Skills*/Maths & Physics	timothy.f.cootes@manchester.ac.uk
Dr Rainer Hinz	Unit co-Lead: *Scientific Skills*/Maths & Physics Unit co-Lead: *Advanced PET & MRI*	rainer.hinz@manchester.ac.uk
Dr Arezoo Zakeri	Unit Lead: *Medical Image Analysis & Artificial Intelligence* (AI)	arezoo.zakeri@manchester.ac.uk

Programme & Curriculum

SHS.Programmes@manchester.ac.uk

Assessment & Progression

SHS.Assessment@manchester.ac.uk

Student Hub

SHS.Hub@manchester.ac.uk

Your Programme

The **MSc in Medical Imaging Science** (MIS) is offered by the **Division** of Informatics, Imaging and Data Sciences (IIDS) which is part of the **School** of Health Sciences (SHS) in the **Faculty** of Biology, Medicine & Health (FBMH) of the University of Manchester.

Programme Structure

The emphasis of the taught part of the programme is on understanding principles of medical imaging and acquiring the skills necessary to apply them. The taught programme is planned around an academic year consisting of two semesters, each of which has 12 weeks of teaching and a two or four-week examination period for semesters 1 and 2, respectively. There is then a three-month research project in the third semester over the summer. In order to complete the programme, total of eight 15-credit **taught units** must be taken together with a 60-credit **dissertation project** for the MSc (worth 180 credits). Students may undertake the necessary preparatory work for the dissertation project during the second semester, as agreed with their supervisor.

First semester course units are compulsory for all students, with the exception of the introductory course units in Mathematics/Physics and Human Biology. Students will take one of these course units as appropriate according to their background, after discussion with the Programme Directors.

All five of the second semester course units are elective. Students should select their course units and inform the Programme Directors of their choices (four out of five) at the end of the first semester.

Part-time students taking the degree over two years should take two taught units in each semester; they should select a project during their first year and conduct the project over the two summer periods.

Aims

The programme aims to:

- Produce graduates with a systematic understanding of the scientific basis of the major medical imaging modalities. (PG Certificate, PG Diploma, MSc)
- Equip graduates with generic transferrable skills required in a multidisciplinary scientific or clinical research environment. (PG Certificate, Diploma, MSc)
- Produce graduates with a broad understanding of the principal clinical applications of medical imaging and its role in diagnosis, monitoring and therapy. (Diploma, MSc)
- Provide graduates with an understanding of the capabilities and limitations of medical imaging for deriving quantitative anatomical and physiological data. (Diploma, MSc)
- Provide graduates with knowledge of how advanced imaging techniques are applied in medical research and drug discovery. (Diploma, MSc)
- Equip graduates with the knowledge and skills required for a career in an image-related field in clinical practice, clinical research, scientific research or technical development. (MSc)

Learning Outcomes

The learning outcomes are detailed below.

A. Knowledge and Understanding

Students should be able to:

A1. Show a systematic understanding of the scientific basis of the principal medical imaging modalities

A2. Show a broad understanding of the role of different medical imaging modalities in healthcare

A3. Show a general understanding of how the requirements of anatomy, physiology and pathology influence the selection of imaging modalities

A4. Understand in detail the advantages and limitations of different imaging modalities in providing clinical information

A5. Show a broad understanding of the capacity and limitations of using imaging to deliver quantitative anatomical and physiological data

A6. Demonstrate broad knowledge of the methods used for data analysis in extracting quantitative information from medical images

A7. Understand the key concepts in the design of an imaging study

A8. Understand the key concepts in experimental design

B. Intellectual Skills

Students should be able to:

B1. Evaluate imaging strategies based on knowledge of the advantages and limitations of imaging modalities

B2. Read and critically evaluate scientific papers in medical imaging

B3. Synthesise and summarise information from literature and other sources in evaluating imaging studies and quantitative data

B4. Apply mathematical and computational modeling techniques to extract quantitative data from images

B5. Design an experimental imaging study

C. Practical Skills

Students should be able to:

C1. Plan and execute quantitative imaging experiments

C2. Use conventional and electronic resources to collect, select and organise complex scientific information

C3. Communicate ideas in the subject clearly in written and oral form to a peer group

C4. Work safely and professionally with imaging equipment in a clinical or research environment

C5. Apply appropriate techniques for analysing scientific data

C6. Use appropriate software for analysing image data, understanding the limitations implicit in the methods.

D. Transferrable Skills and Personal Qualities

Students should be able to:

D1. Independently manage time and resources and set priorities effectively to meet a deadline

D2. Communicate complex ideas clearly, both orally and in writing, using a variety of media

D3. Cooperate in small teams to achieve goals

D4. Demonstrate a professional and responsible attitude to work

Course Units Overview

First semester course units (all compulsory)

Scientific Skills*:* leaders Dr Rainer Hinz & Dr Richard Hodgson

To provide students with fundamental knowledge and skills necessary for the programme. Students join the programme with a variety of backgrounds. This course unit will introduce Human Biology to the students from a mathematics/physics/engineering background and Maths/Physics to the biomedical students. The unit also comprises introductory lectures on Chemistry and on Pharmacology relevant for Imaging which all students are expected to take. The course unit is mostly delivered during the first three weeks of the semester.

Mathematical Foundations of Imaging*:* leader Prof. Tim Cootes

To provide students with the mathematical foundation necessary to undertake the imaging course units. The material in this course unit provides a common knowledge and skill base for the remainder of the programme. Optional practical sessions on programming are also provided as part of this unit. The course unit is delivered between weeks four and twelve of the semester.

Radioisotope Imaging*:* leader Dr Adam McMahon

This course unit provides an overview of imaging methods that use radioactive tracers. It covers the chemistry of production of tracer molecules, instrumentation and imaging techniques, such as PET and SPECT. There is also discussion of clinical and research applications, including visits to clinical imaging facilities. The course unit is delivered between weeks four and twelve of the semester.

Non-Isotope Imaging*:* leader Dr Marie-Claude Asselin

This course unit provides an overview of the major imaging methods that do not use radioactive tracers. There is an emphasis on Magnetic Resonance Imaging (MRI), as this represents a wide range of imaging techniques. Clinical ultrasound imaging and X-ray imaging, such as Computed Tomography are also covered. The course unit is delivered between weeks four and twelve of the semester.

Second semester elective course units (select four from five)

Advanced Positron Emission Tomography (PET) ***& Magnetic Resonance Imaging*** (MRI)*:* leaders Dr Rainer Hinz & Prof. Laura Parkes

This course unit leads on from the radioisotope imaging and non-isotope imaging course units. It covers the production and radiochemistry of PET tracers, instrumentation and image reconstruction, kinetic modelling and example applications. It also addresses advanced techniques and applications of MRI, including contrast agents, perfusion and diffusion imaging, and spectroscopy.

Quantitative Imaging Into Practice (QIIP)*:* leader Dr Marie-Claude Asselin

This course unit addresses the question of imaging biomarkers, covering the diverse range of imaging biomarkers, the requirements for validation of biomarkers, their use in clinical practice and drug discovery, and regulatory issues.

***Mathematical Computing for Medical Imaging**:* leader Prof. Tim Cootes

This course unit covers the basic tools and algorithms for quantitative image interpretation. The computational requirements for a number of important mathematical processes are discussed. Students will carry out programming exercises related to specific algorithms.

***Imaging in Clinical Diagnosis**:* leader Dr Richard Hodgson

This course unit seeks to develop an understanding of the roles of different imaging modalities in clinical diagnosis, and how imaging techniques may be applied to answer specific clinical questions. It will consist of a mixture of linked presentations, group discussions and image viewing sessions.

Medical Image Analysis and Artificial Intelligence (AI)*:* leader Dr Arezoo Zakeri

This course unit seeks to introduce key image processing tools and methodologies for medical image analysis, and to introduce machine learning techniques for medical image interpretation and processing. Students will learn evaluation metrics for the assessment of medical image analysis methods and will use key Python libraries for image analysis.

Full details about each course unit can be found here

It is your responsibility to regularly check **Blackboard** and your **university email account** for new material or course information.

Please note that a **Dissertation Guide** will be provided later on in the academic year, which must be read in conjunction with this handbook.

Non-credit bearing Introductory Course

All students are automatically enrolled onto the non-credit bearing Introductory Courses (SHSS60001) that provides information on **Health & safety**, **Academic malpractice** and **Academic literacy**. Completion instructions for each of these sections are clearly defined within the online course.

Completion of the **Health & safety** and **Academic malpractice courses** is **mandatory for all students**. All assessments must be completed as soon as possible after the programme begins, with the academic malpractice assessment completed by Friday **11th October 2024**, before the first piece of coursework is submitted. Completion of these units is monitored by the School. All students are strongly advised to also complete the Academic literacy section.

Teaching, Learning and Assessment

Successful progression through the programme relies on self-directed learning. It is up to you to plan your time and we strongly suggest that you consider the programme timetable in conjunction with the syllabus to help you with this. Your success is dependent on considerable commitment and self-discipline.

In order to get the most out of the programme, you will also need to participate actively in seminars and tutorials â€“ not only to complete the course units but to benefit from the resulting exchanges of ideas. If you know in advance that you cannot attend/participate in a teaching activity, please let the unit leader know as soon as possible.

It is expected that you spend approximately 150 hours of study time per 15-credit unit. This includes activities such as attending lectures, studying the teaching material, participating in supporting activities such as online exercises, completing the in-semester assignments, and revising for and sitting the examinations.

IMPORTANT: We will be using your university email account as the main method of communication with you. You are advised to check any spam or other filtered folders regularly in case documents do not reach your inbox. You are responsible for ensuring that we have your most up to date contact information at all times. University academic and admin staff will ONLY communicate with you using your university e-mail address (allocated to you at the time of registration) and will not respond to messages from private e-mail addresses thereafter.

Expectations and Responsibilities of Staff and Students

The University of Manchester believes that education must be a partnership between the learner and the teacher, conducted within a context that provides properly for pastoral and tutorial needs. As a student at The University of Manchester, you can expect to receive an education of high quality with high standards of teaching, resources and support services. You also have responsibilities, and some of these are listed below.

You may expect:

- a good education which entails high standards of teaching and supervision, resources and support services;
- educational facilities that support your learning development, such as library and computer facilities and study skills programmes;
- opportunities to let us know your opinion on how well we have succeeded in these objectives.

You will be expected to:

- pursue your academic work with a positive commitment;
- meet the standards of good academic practice by submitting work which is your own and which fully acknowledges the ideas and contributions of others through careful referencing;
- ensure that you understand what is meant by â€˜academic malpracticeâ€™ and to seek advice if you are in any doubt;
- maintain as confidential, any research data shared with you for the purposes of teaching or for the dissertation project research and not share such data with others without the written permission of your supervisor/lecturer

- take full advantage of resources and facilities offered by the academic environment, including contact with staff and other students;
- take the initiative in raising problems or difficulties (academic or personal) with an appropriate member of staff, however elementary or trivial these problems may seem; prompt discussion and resolution of problems can prevent difficulties at a later stage;
- submit work when required to do so; meet deadlines; and endeavour to take an active, not passive, role in seminar discussions;
- attend as required by your School and report promptly to tutors, your lecturers, or other appropriate members of staff, and provide explanations for any interruptions in attendance on their course (e.g. for medical or personal reasons). You **must** inform staff of any prolonged absence.

Examination Board

Members of the Examination Board includes the Programme Directors together with the unit leaders and a chair from another programme who are overseen by an External Examiner from another university or training body. It is the role of the Examination Board to review all the results **anonymously** and make decisions on the award of credit and who can re-sit exams/assessment or gain compensation. It is also the role of the Examination Board to decide who cannot continue and will leave the University with an exit award (PG Certificate, PG Diploma). You will be notified of your result via email within two weeks of the Exam Board meeting taking place.

The External Examiner for this programme is Dr Marco Polombo who is a Senior Lecturer and co-lead of the Cardiff University Brain Research Imaging Centre, Cardiff, UK.

Please note that it is inappropriate for students to make direct contact with External Examiners under any circumstances, in particular with regards to a studentâ€™s individual performance in assessments. Other appropriate mechanisms are available for students, including the Universityâ€™s appeals or complaints procedures and the UoM Studentsâ€™ Union Advice Centre. In cases where a student does contact an External Examiner directly, External Examiners have been requested not to respond to direct queries. Instead, External Examiners should report the matter to their School contact who will then contact the student to remind them of the other methods available for students. If students have any queries concerning this, they should contact the Programme Support Team SHS.Programmes@manchester.ac.uk in the first instance.

In conjunction with the programme handbook, you are expected to carefully read the **SHS Student Handbook** which explains the academic policies and procedures as implement by your School. The SharePoint covers the important topics of:

- attendance monitoring
- late submission and word count penalties
- mitigating circumstances and extensions
- marking and degree classification
- compensation and resit of failed course units
- academic malpractice.

Student Representative and feedback

At the start of the new academic year, students are asked to elect a Student Representative (Rep) for the programme. The role of a Student Rep is:

- to act as an advocate for individual students or groups of students;
- to provide feedback about the University and the student experience, both to the University and to the student body; and
- to engage students in actively developing the programme.

The Student Reps make a crucial contribution to the quality assurance and enhancement procedures for the Programme, School and greater University.

The programme Student Rep will be expected to serve on committees within the Division, among which the Programme committee comprising the Programme Directors, Unit Leaders and Programme Support Team members who meet once per semester. You will thus have the opportunity to provide specific feedback at the end of each semester via the Student Rep and as well as by participating in the student surveys. We value student feedback very highly, so please fill in the feedback forms or online surveys at every opportunity. All feedback is anonymised, so that you can feel free to be honest.

Sharing Information

The University may share appropriate information relating to your health and/or conduct with external organisations such as your professional employer(s) (for example, relevant NHS Trust), placement and training providers and/or regulator (such as GMC, FOM, BOHS, NMC, GDC etc.). This may occur where concerns in relation to your health and/or conduct arise and the University considers it necessary for them to be disclosed to one or more of the above organisations. The Universityâ€™s Privacy Notice for Registered Students (which is accessible via this link: www.regulations.manchester.ac.uk/data-collection-notice/) includes further information about how the University may use and process your personal data, including the legal basis and conditions which may be relevant to such processing (see section 6 of the Privacy Notice). The University will only disclose special category data (such as data relating to your health) to a third-party organisation where one of the additional conditions are satisfied (see section 9 of the Privacy Notice), including where processing is necessary for reasons of substantial public interest.

Learning Resources

Libraries

Main University Library

The Main University Library (Campus map 55) holds a very wide range of books and periodicals, and provides many other services. There are sections covering physical sciences, computing, medicine and biology. The **Stopford Library** (Campus map 79) holds major collections in biology, medicine and health and is located on the 3rd floor of Stopford Building. The six study rooms can be booked for 2 to 14 people using Resource Booker.

Computer Facilities

Stopford Computer Facilities

The computing facilities available to all students in the Stopford Building comprise 4 PC clusters. The clusters are networked and have full access to the Internet. All students have individual e-mail accounts and a small amount of private file space on the e-mail systems.

Imaging Science Computer Lab

In addition to the PC clusters in Stopford Building and elsewhere which are available for student use, there is a dedicated computer room for MSc students in G.532, Stopford. The room is accessed by key pad and the number is **C4589Y**. The computers in this room can be accessed using your university ID and password.

Access to the corridor in which the room is located requires your student swipe card. **Your card must be validated by a member of the Division admin staff** â€“ please contact Catherine Shortt catherine.shortt@manchester.ac.uk to request access.

Alan Gilbert Learning Commons

The Alan Gilbert Learning Commons (Campus map 63) is a flexible study and learning centre with accessible study spaces throughout the building. It is one of the Universityâ€™s major computer cluster locations and provides quick access to PCs as well as digital screens that can be connected to laptops. It has an onsite cafÃ© in the foyer at the back of the building and a nap zone located on the 2nd floor. It is one of the few university buildings open during the Christmas closure period.

Maps and Directions

Campus map

http://www.manchester.ac.uk/aboutus/travel/maps

Wolfson Molecular Imaging Centre (WMIC)

27 Palatine Road, Withington, Manchester, M20 3LJ

NIHR/Wellcome Trust Manchester Clinical Research Facility

Grafton St, Manchester M13 9WL

https://research.cmft.nhs.uk/facilities-services/clinical-research-facility/adults-clinical-research-facility

St Maryâ€™s Hospital, Manchester University NHS Foundation Trust

Oxford Road, Manchester, M13 9WL

The PET-MR scanner is located adjacent to the Nuclear Medicine department on the ground floor of the hospital.