

List of PGT Degree Programmes

Programmes
Bioinformatics and Systems Biology
Biochemistry, Biological Science, Cancer Research and Molecular Biomedicine, Cell Biology, Developmental Biology, Neuroscience
Biotechnology and Enterprise
Cardiovascular Health & Disease
Clinical Biochemistry
Clinical Immunology
Genomic Medicine
Medical Microbiology and Medical Virology
Medical Sciences
Neuroimaging for Clinical and Cognitive Neuroscience
Oncology
Pathology
Psychology
Reproduction and Pregnancy
Tissue Engineering for Regenerative Medicine (TERM)
Translational Medicine

MSc Bioinformatics and Systems Biology

MSc Bioinformatics and Systems Biology students do two research projects over the year, each of them taking about 3 months. The first project runs from end of January to end of April, the second from mid-May to end of August. These projects can involve any application of computational techniques to biological and medical research, including software development, web resource or database development, data analysis, model building and simulation, etc. Projects should be dry only i.e. the students shouldn't have to carry out lab experiments themselves, but students are encouraged to work in close interaction with experimental researchers and PIs from experimental labs are welcome to supervise these projects. The students will have had bioinformatics teaching and should be able to work mostly independently. Expectations for supervisors are to meet with the student regularly (generally once a week) in order to advise them on the project and follow their progress, and to first/second mark dissertations.

Programme Director:

Dr Jean-Marc Schwartz (jean-marc.schwartz@manchester.ac.uk)

MRes Biological Science, MSc Biochemistry, MSc Cancer Research and Molecular Biomedicine, MSc Cell Biology, MSc Developmental Biology, MSc Neuroscience.

The projects for the research intensive masters programmes are usually hypothesis-driven, and address a specific research question specific to the field of the programme. The students are expected to spend the majority of their time in the labs undertaking the project. Therefore the projects should have the scope to allow that level of work. A core component

of the MRes style masters programmes is the training in wet lab research skills. This means that the project should have a substantial opportunity for training the students and then consequentially carrying out the lab work by themselves. The intended learning outcome is that the students demonstrate that they are capable of undertaking research in a lab environment and that they can acquire and use new lab skills. Due to the limited timeframe alternative hypothesis testing based on their findings is not required. Normally students work alongside a PhD or Post-doc and help with the completion of an aspect of their lab project.

Programme Directors:

Dr Ingo Schiessl (i.schiessl@manchester.ac.uk)

MSc Biotechnology and Enterprise

These one year Biotechnology Research Projects span the life sciences. Our students have undertaken projects with supervisors located throughout the Faculty of Biology, Medicine and Health as well as other Faculties- MIB, SEAS. Topics include recombinant protein expression in a variety of eukaryotic and bacterial cells (CHO, insect, bacteria, yeast, plants, algae), biofuels, diet and health, environmental and medical diagnostics, green chemistry, biofuels, DNA barcoding-insects/plants, bioremediation, bioinformatics/genomics/RNAseq, cell/matrix biology, immunology, stem cells, combatting antibiotic resistance, protein structure, natural polymers and circadian clocks. The research project starts with a literature review (4000 words) in November, which is submitted in January. The research project starts in February with the equivalent of ~3 days per week due to taught course units and is full-time in May-August. At the end of May the students talk on their projects. The final project (6000 words) is submitted in September in the format of a research article suitable for a scientific journal. Most Biotechnology and Enterprise students have prior laboratory research experience including working in industry. Supervisors would normally be expected to provide the training that is specific to the research project.

Programme Director:

Dr Anil Day (anil.day@manchester.ac.uk)

MRes Cardiovascular Health and Disease

Cardiovascular diseases are major causes of mortality and morbidity in the developed world. The high incidence of these dictates the need for continued research into these disorders for the development of new treatments for them. The MRes in Cardiovascular Health and Disease will provide students with specialist knowledge of the cardiovascular system in health and disease with an emphasis on translational 'bench to bedside' research. The course will consist of both taught (research methods, laboratory skills, tutorials, seminars, masterclasses) and research modules. We have a wide range of research projects for students to choose from, offered by basic scientists and clinicians. Training in generic skills (academic writing, communications etc.) will also be provided. Assessment will be via dissertation.

Programme Directors:

Dr Ashraf Kitmitto (Ashraf.Kitmitto@manchester.ac.uk)

Dr Elizabeth Cartwright (Elizabeth.j.cartwright@manchester.ac.uk)

MSc Clinical Biochemistry

The MSc in Clinical Biochemistry provides a unique opportunity to gain insight into this specialist area of laboratory medicine from clinical and scientific leaders in the field.

What is Clinical Biochemistry?

A scientific discipline within laboratory medicine which deals with the clinical analysis of body fluids and other biological material to aid the diagnosis, therapy and monitoring of diseases. Clinical Biochemists are typically scientists who work in hospital laboratories providing advice and interpretation of analytical results to other healthcare professionals (clinicians/general practitioners/nurses etc). They are also involved in development and innovation of new analytical methods and improvement of clinical services including quality assurance and audit.

The Masters programme:

Manchester's MSc in Clinical Biochemistry will provide knowledge and understanding of the normal physiology and pathophysiology of the major organs and endocrine systems, as well as more specialist areas such as paediatric biochemistry and drug monitoring. The course will give core knowledge and understanding of clinical disorders and how biochemical parameters and laboratory methods are used for the investigation, diagnosis and management of patients.

Our students

Our course attracts a wide range of students from a bioscience and medical background from home and abroad. Many students study this course as a springboard for further academic research or as a stepping-stone before applying for the NHS scientist-training programme (STP). The course also may help individuals with their own career progression if they are already working within a clinical laboratory. The course also attracts intercalating medical students and professionals who may wish to specialise in clinical biochemistry / chemical pathology.

Research Projects

The course delivers a practical element via a 60 credit research project/dissertation for approximately 10 weeks over the summer months. A variety of projects are offered which reflects the diverse nature of the course and therefore we welcome projects from different specialisms e.g. biochemistry, Immunology, haematology, microbiology/virology or pharmaceutical science etc. We would also welcome projects that involve many different laboratory techniques e.g Mass spectrometry, chromatography, protein analysis, ELISA, spectrophotometry, bioinformatics, genomics or PCR etc. The field of clinical biochemistry is evolving and expanding constantly therefore we would be happy to discuss any other potential projects ideas.

How can I find out more?

clinicalscience@manchester.ac.uk

Programme Director:

Dr Phil Macdonald (Philip.macdonald@manchester.ac.uk)

MSc Clinical Immunology

The MSc in Clinical Immunology provides a unique opportunity to gain insight into this specialist area of laboratory medicine from clinical leaders in the field, in addition to academic teaching from researchers at the forefront of immunology.

The programme provides a fundamental understanding of the principles and mechanisms of the immune system and immune responses in the context of infection, malignancy and immunological disorders. Six modules span the field of Clinical Immunology, with teaching being delivered both on campus and on hospital sites. Content covers basic and advanced immunology, immune deficiency, hypersensitivity, haematological malignancy and autoimmunity. The course also delivers assays and techniques employed in the clinical laboratory to allow enhanced understanding and clinical interpretation of results. In addition to the taught component, a focused literature review and research project allows students to develop critical and experimental research skills relevant to the field.

Programme Directors:

Dr Joanne Pennock (joanne.l.pennock@manchester.ac.uk)

Dr Nicholas Barnes (nicholas.barnes-2@manchester.ac.uk)

MSc Genomic Medicine

These are *in silico* projects and no practical work is normally allowed. Projects must be on an aspect of human genomics, frequently analysing or interrogating genomic data.

Examples:

- Service evaluation e.g. molecular diagnosis from next generation sequencing data
- Correlation of phenotype and genotype
- Case review of disease, genetics, counselling etc.

Past project offers have included:

- Copy number variation and cardiovascular structure in the UK Biobank cohort
- Determining the incidence of compensated pathogenic deviations (CPDs) in mutation-negative gene panel tests
- Creation of a gene/disease report for a clinically important gene for use in the evaluation of possible disease causing variants in diagnostic sequencing, with focus on dysmorphology
- A case study to explore patient motivations for genomic testing within the 100,000 genome project

Programme Director:

Dr Forbes Manson (forbes.d.manson@manchester.ac.uk)

MSc Medical Microbiology and MSc Medical Virology

The MSc in Medical Microbiology course has its roots in a prestigious qualification developed in the early 1920s by Professor WWC Topley. As such, it can be considered to be the oldest taught postgraduate microbiology qualification in the country, and probably in the world.

The programme runs in parallel with the MSc in Medical Virology. In the era of AIDS, avian and swine Influenza, Ebola and other emerging viral infections, the importance of medical virology as a co-discipline with medical microbiology is increasingly recognised.

The MSc and Diploma programmes in Medical Microbiology and Medical Virology are intensive postgraduate taught programmes encompassing the medical and molecular aspects of virology, bacteriology and mycology, as well as immunity to infection and epidemiology. You will explore the current issues and concepts in medical microbiology and virology, and acquire the academic and practical skills necessary to make independent, informed judgements in relation to these issues.

Teaching is delivered using lectures, seminars, tutorials and comprehensive practical classes. Other teaching includes the use of face-to-face sessions and blended learning methods with some material delivered and assessed online. You will be assessed via continual assessment and formal theory and practical examinations.

Research Projects

The course delivers a practical element via a 60 credit research project/dissertation for approximately 10 weeks over the summer months. A variety of projects are offered which reflects the diverse nature of the course and therefore we welcome projects from different specialisms e.g. bacteriology, virology, mycology, parasitology, biochemistry, immunology, pharmacy, medicine, dentistry, nursing or even multi-disciplinary, but all should retain an emphasis on infection. These may be lab-based investigations/evaluations, clinical audits, systematic reviews.

Programme Director:

Dr Carol Yates (Carol.Yates@manchester.ac.uk)

MRes Medical Sciences

To provide a niche opportunity for medical students keen on pursuing a career in academic medicine to undertake intensive training in biomedical research, the Intercalated MRes in Medical Sciences was established in 2005. This strategic development complements the NIHR Integrated Clinical Academic Clinical Training Pathway, and enables prospective clinician-scientists to receive a strong early experience within Manchester's research groups. Participation in this programme offers a twin approach of being embedded in a successful research group whilst receiving academic tutelage and broader careers guidance. These learning outcomes are delivered by input from senior clinical academic staff who understand (and live) the dual realities of future clinician-scientists. Our intercalating students undertake a full time research project and also participate in a series of tutorials and seminars designed to equip them with skills in critical appraisal and scientific writing.

Programme Director:

Professor Kimme Hyrich (Kimme.hyrich@manchester.ac.uk)

MSc Neuroimaging for Clinical and Cognitive Neuroscience

Research projects in Neuroimaging for Clinical and Cognitive Neuroscience will be undertaken during the second half of the programme. Formally, the project work starts after the completion of semester two and runs through the summer months, with submission of a poster and a report in early September. However, considerable reading, planning, piloting and setting-up can be achieved during the latter part of semester two.

All projects must involve a substantial amount of image analysis work and can involve fMRI, structural MRI (inc. VBM), EEG ERP, PET, TMS or a combination of these. The data can

already have been collected, but in these cases, it must be very clear that a very substantial amount of analysis work and interpretation is required and that this work is novel for this data-set.

Students will be highly trained in SPM, FSL and EEG analysis tools and will have a working knowledge of a number of other analysis procedures including connectivity analyses, DTI and phMRI. While students will be able to draw on the expertise of the MSc teaching team for the benefit of their research, the supervisor (or the supervisor's research team) must be able to provide ample support in methodology.

The aim of the projects is to provide students with an experience of using analysis techniques in a research environment, hopefully within a team setting where they will integrate with others doing imaging work. The aims of the project are not specifically to provide students with experience in Ethics, specialist participant recruitment (e.g., clinical populations) or similar areas of the research. Therefore while these may form a part of their work, these should not be the major responsibility of the student but of the supervisor.

Programme Directors:

Dr Cheryl Capek (Cheryl.capek@manchester.ac.uk)

Dr Jason Taylor (Jason.taylor@manchester.ac.uk)

MRes Oncology

This is an exciting and stimulating course and is one of only a handful of MRes Oncology courses available across the country. It is primarily aimed at 3rd and 4th year intercalating MBChB students who have an interest in both medical and clinical oncology, although it will also be relevant to basic biological scientists with an interest in oncology. Modern oncology practice requires an understanding of the scientific basis of cancer and its treatment, as well as demanding the skills needed to evaluate the potential efficacy of new treatments. The MRes in Oncology will equip students with these essential skills by using the unequalled expertise available between the Faculty of Biology, Medicine & Health, Manchester Cancer Research Centre, the CRUK Manchester Institute and the Christie NHS Foundation Trust. The course combines formal lecture-based teaching, small group tutorials with active researchers and practising clinicians, and on-line modules. This taught element cover a wide range of topics including cancer epidemiology, screening and prevention, pathology, diagnosis, radiology, delivering a cancer service, cancer biology and principles of cancer therapy. A major component of the MRes is a research project; a wide range of projects are available with some of the UK's leading cancer researchers using state-of-the-art facilities and equipment.

Programme Director:

Dr Guy Makin (Guy.makin@manchester.ac.uk)

BSc (Hons) Pathology

The intercalated BSc in Pathology programme provides the opportunity for medical students of high ability who are considering a career in academic medicine or pathology related disciplines, to study pathology as a science and to gain an insight into molecular pathology and laboratory medicine. In addition to gaining an understanding of the scientific principles that underpin modern medical practice students will become skilled in a range of laboratory techniques and experience the challenges of performing a substantial laboratory based research project. It is a self-contained and highly integrated programme consisting of 5 elements: General Pathology & Oncology; Systemic Pathology (covering modules such as Cardiovascular, Gastrointestinal, Neuropathology, and Lymphoreticular; Multidisciplinary Investigative Research Training, a literature review written assignment and a laboratory

based research project occupying 3 days per week. Assessment is by written assignments (7.5%), oral presentation (7.5%), essay based examinations (30%) and a research dissertation (55%).

Programme Directors:

Dr Richard Byers: Richard.Byers@cmft.nhs.uk; r.byers@manchester.ac.uk

Professor DC Mangham: d.c.mangham@manchester.ac.uk

MRes Psychology

MRes projects can be any area of psychology and can be qualitative or quantitative in nature. Although most students will collect their own data, analysis of a provided dataset is also permissible as long as there is sufficient scope and depth for the student to demonstrate their research skills. Projects which require NHS ethics not already in place are generally discouraged due to the stress of the time demands. During Semester 1, students will be provided with some suggestions for possible projects and/or project areas as well as encouraged to use staff web pages to identify areas of research in which the student has an interest. Students will put forward their ideas for an empirical study, and these will be used to match them up with a supervisor within the School who is familiar with the area and is willing to supervise the proposed project or one which is similar (project to be agreed between student and supervisor). Then, the student and supervisor will meet (October/November, Semester 1) in order to arrive at a preliminary outline of a dissertation research proposal. The student will be required to develop the outline proposal into a fully designed project prior to a meeting (June/July, Semester 2), at which the student and supervisor will finalise the design and all aspects of the conducting of the research (including future supervisory meetings) over the summer. Thus, the supervision period will extend across the whole academic year. For ESRC 1+3 students, the dissertation will serve as a pilot study for their 3-yr PhD research. For other MRes students, it will be a stand-alone research study.

Students will have at least twelve meetings with the dissertation supervisor over the year, to discuss the aims and objectives of the study, to enable the student to arrive at a final design, and to facilitate the conducting and writing up of the research. Supervisors will give general advice and help with analysis when necessary, and will provide feedback on one draft version of the final dissertation.

Programme Directors:

Dr Luke Jones (luke.jones@manchester.ac.uk)

Dr Karen Lander (Karen.lander@manchester.ac.uk)

MRes in Reproduction and Pregnancy

The MRes (Masters in Research) in Reproduction and Pregnancy is a 1 year full time course providing experience and training in reproductive medicine and pregnancy-related research. It is open to intercalating medical students (after completion of 3rd or 4th year) as well as to graduates with a science-based or medical degree. This course is ideally suited to those with a future interest in Obstetrics and Gynaecology and/or wishing to gain experience of translational medical research. No previous research experience is required.

Students complete two related research projects on a specific area of reproduction or pregnancy. The first is a literature review and research proposal, leading to research project 2 which is a 6 month project. Both laboratory and clinical research projects are offered. The research projects are complemented by taught units providing general research skills and covering broader aspects of reproduction and pregnancy, including major landmarks in pregnancy research, infertility and the major diseases of pregnancy, clinical trials, topical developments, and ethical and social issues. The new Masterclass in Reproduction and

Pregnancy unit provides students with cutting edge knowledge of reproductive medicine and obstetric research, and showcases our pioneering research antenatal clinics. Students will also complete a series of practical skills workshops, to provide experience and training in wide range of laboratory techniques applicable to reproductive and pregnancy research.

Programme Directors:

Professor John Aplin (john.aplin@manchester.ac.uk)

Dr Rebecca Jones (rebecca.lee.jones@manchester.ac.uk).

MRes Tissue Engineering for Regenerative Medicine (TERM)

The MRes in TERM projects are designed to offer students multidisciplinary training in all aspects of tissue engineering and regenerative medicine. Projects can cover any area relevant to the field, including biomaterials design/fabrication/analysis, stem cell culture and differentiation, cell-biomaterial interactions or gene therapy.

Students undertake two linked projects in the same laboratory. In semester 1 (Oct-Jan) students undertake a 10-week literature review and prepare a research proposal. In semester 2 (Feb-July) they undertake a 25-week full-time laboratory-based project. The 6,500-word literature review allows students to develop skills in literature searching, critical appraisal and scientific writing, while the 2,500-word research proposal provides an opportunity for students to formulate a hypothesis and design a research project. The laboratory-based project will be in the same area studied in project 1, but may not be identical to the study designed by the student in their research proposal. The project should offer practical experience across a range of techniques and allow students to fully analyse and interpret experimental data. Students will finally prepare a 10,000-word dissertation and give a 10-minute oral presentation, allowing them to enhance their skills in scientific writing, data presentation, analysis and discussion.

Supervisors are expected to meet with their students regularly throughout both projects, but particularly in project 2 where they should hold progress meetings on a weekly or fortnightly basis. Supervisors are also expected to aid students in the preparation of their written work, and to read and comment on a single draft of the literature review, research proposal and dissertation. Students should be incorporated into the host laboratory and are encouraged to attend lab meetings and journal clubs. Supervisors will be required to first-mark their own students work (along with a second independent examiner) and to second-mark work from another student within the cohort.

Programme Director:

Dr Stephen Richardson (S.richardson@Manchester.ac.uk)

MRes Translational Medicine

The MRes Translational Medicine is an interdisciplinary programme with training in genetics, genomics, proteomics and metabolomics. Students include both home and international basic science students from biomedical sciences backgrounds, and intercalating medical students (internal and external).

Our research projects generate empirical data, and are usually hypothesis-driven addressing a specific research question. Projects range across the translational spectrum from basic science, to more clinically applied research, including both 'wet-lab' and computational biology approaches e.g. bioinformatics or analysis of genetic data.

Examples of previous projects can be found here:

www.bmh.manchester.ac.uk/medicine/study/masters/translational-medicine-mres/?pg=2#course-profile

The aims of the research project are for students to acquire experience of the research process, develop research questions and use research methods to answer these questions, and to equip students with the knowledge and empirical research skills to pursue a research or clinical academic career.

Projects are 120 credits. Research project 1 (30 credits) starts in early December for 10 weeks; this is primarily literature based, including a literature review and research proposal. Research Project 2 (90 credits) entails full time research, and runs from mid-February to mid August for 25 wks. Assessment of project 2 is by dissertation, individual poster presentation and assessment of research performance.

Supervisors are expected to maintain contact with the student through regular (e.g. weekly) meetings, and to provide an alternative day-to-day contact, where necessary. Supervisors should provide guidance about the project, oversee progress, provide feedback on drafts and assess project written work. Supervisors should also encourage the student to present their work to research group members, and externally, where appropriate.

Programme Directors:

Dr Janine Lamb (Janine.Lamb@manchester.ac.uk)

Dr John Curtin (John.Curtin@manchester.ac.uk)