Programme of study for the integrated degree of PhD and MSc (Artificial Intelligence for Medical Diagnosis and Care)[1] 2020/21

Entry Requirements

A minimum of a II(i) honours degree, or equivalent qualification, in a Medicine and Health or Science, Technology, Engineering, Mathematics (STEM) subject.

For candidates whose first language is not English IELTS 6.5 overall, 7 writing, 6.5 other sections or TOEFL 100 overall, 25 writing, 22 other sections or equivalent.

Year One (a total of 180 credits in taught modular courses will be taken over Years One and Two as well as the research project)

- PGRs will register in the School of Computing and will hold an honorary NHS contract throughout the four years of their research training.
- PGRs will commence research under the direction of their supervisor(s) from month 6. Each PGR will be supervised by at least one supervisor from the field of AI, normally from the School of Computing, and one drawn from the field of medical diagnosis and care, normally an academic clinician (School of Medicine) working within Leeds Teaching Hospitals Trust.
- PGRs will complete a training needs analysis and agree a training plan with their supervisor(s) in month 7

- Compulsory training and skills modules:

  COMP5712M Programming for Data Science (15 credits)
  COMP5450M Knowledge Representation and Reasoning (15 credits)
  COMP5623M Artificial Intelligence (15 credits)
  COMP5611M Machine Learning (15 credits)
  MEDR5310M Getting Started in Health Research (15 credits)
  YCH15010M Informatics in Healthcare (15 credits)
  YCH15015M The Legal, Ethical and Professional Considerations in Healthcare Data Research (15 credits)
  COMP5900M Research Project (AI in Medical Diagnosis and Care) (30 credits)

- PGRs will be required to study 45 credits from the following optional modules across years one and two:

  COMP5122M Data Science (15 credits)
  COMP5511M Principles of Data Science & Analytics (15 credits)
  COMP5510M Data Science & Analytics for Causal Inference and Prediction (15 credits)
  COMP5122M Data Science (15 credits)
  COMP5400M Bio-Inspired Computing (15 credits)
  YCH15035M Clinical Knowledge Management and Decision Support Systems (15 credits)
  YCH15055M Health Data Analytics and Visualisation (15 credits)
  MATH5743M Statistical Learning (15 credits)
  MATH5820M Bayesian Statistics and Causality (15 credits)
  LUBS5980M Innovation Management in Practice (15 credits)
  LUBS5308M Business Analytics and Decision Science (15 credits)

  PGRs may also choose up to 30 credits from the University's taught postgraduate modules, subject to approval by the Module Leader and Programme Director.

Year Two (a total of 180 credits in taught modular courses will be taken over Years One and Two as well as the research project)

- PGRs will continue research under the direction of their supervisor(s) and complete remaining taught module requirements

- Compulsory training and skills module:

1 To be read in conjunction with the general Programme of Study for the Integrated degrees of PhD and Master (MA, LLM or MSc)

COMP5450M Knowledge Representation and Reasoning (15 credits)

- Month 18: First formal progress report
- Month 24: Undergo the transfer assessment process at the end of year 2 (month 24).
- PGRs will be required to gain an average of 50% or higher over 180 credits and pass a minimum of 150 taught credits (of the total 180 credits undertaken) and successfully Transfer to full PhD status in order to progress on the programme.
- During years 2-3 there is the opportunity for a 3 month placement with an industry or public-sector partner.

Years Three and Four

- The PGR will continue research under the direction of their supervisor(s)
- Months 36 and 48 Annual Progress Review

Learning Outcomes / Transferable Key Skills / Learning Context / Assessment – overall programme Integrated degree of PhD and MSc (Artificial Intelligence for Medical Diagnosis and Care)

1. Learning Outcomes

On completion of the programme PGRs should have shown evidence of being able:

- to discover, interpret and communicate new knowledge through original research and/or scholarship of publishable quality which satisfies peer review
- to present and defend original research outcomes which extend the forefront of a discipline or relevant area of professional/clinical practice
- to demonstrate systematic and extensive knowledge of the subject area and expertise in generic and subject/professional skills
- to take a proactive and self-reflective role in working and to develop professional relationships with others where appropriate
- to independently and proactively formulate ideas and hypotheses and to design, develop, implement and execute plans by which to evaluate these
- to critically and creatively evaluate current issues, research and advanced scholarship in the discipline
- to demonstrate systematic knowledge of and be able to critically assess, analyse and engage with the ethical and legal context of their research and any ethical and legal implications of their research.

In addition the CDT has learning outcomes specific to the AI in Medical Diagnosis and Care programme which are:

LO1: In-depth knowledge in AI, with a strong understanding of multi-modal systems that combine structured and unstructured data sources, and systems that explain their inferences.

LO2: Proven expertise in the development of AI systems, data handling, high performance computing and visualisation.

LO3: State of the art knowledge and skills necessary to conduct research in a specialist area within the health domain.

LO4: Proven creative abilities and generic skills necessary to conduct research successfully in any domain.

LO5: Familiarity with working in industry and health service environments.

LO6: A rigorous understanding of the process and challenges in transferring research innovation into routine clinical practice and new health products.

LO7: An understanding of the wider ethical, legal and societal factors involved in responsible research and innovation, particularly in the health domain.

2. Transferable (Key) Skills

PGRs will have had the opportunity to acquire the following abilities through the research training and research specified for the programme

- the skills necessary for a career as a researcher and/or for employment in a senior and leading capacity in a relevant area of professional/clinical practice or industry
- evaluating their own achievement and that of others
- self-direction and effective decision making in complex and unpredictable situations
- independent learning and the ability to work in a way which ensures continuing professional development

3. Learning Context

This will include the critical analysis of, and decision making in, complex and unpredictable professional and/or clinical situations. The structure of the programme will provide research and/or professional training, breadth and depth of study and opportunities for drawing upon appropriate resources and techniques. Opportunities will be provided for PGRs to:

- develop to a high level interests and informed opinions
- develop to a high level their design and management of their learning activities
- develop to a high level their communication of their conclusions
- make an original contribution to the field

PGRs will be expected to engage in the exercise of autonomous initiative in their study and work in professional environments.

4. Assessment

Achievement will be assessed by the examination of the candidate's thesis[2] and performance under oral examination. Assessment will involve the achievement of the candidate in:

- evidencing an ability to conduct original and independent broad and in-depth enquiry within the discipline or within different aspects of the area of professional/clinical practice normally leading to published work
- drawing on and/or developing a range of research techniques and methodologies appropriate to enquiries into the discipline/area of professional practice
- demonstrating independent critical ability in the application of breadth and depth of knowledge to complex issues within the discipline or specialist area of professional/clinical practice
- drawing on a range of perspectives on the area of study
- evaluating and criticising received opinion
- making reasoned and well-informed judgements on complex issues within the specialism whilst understanding the limitations on judgements made in the absence of complete data
- the written style and overall presentation of the thesis

[2] or alternative form of thesis