Postgraduate Programme Specification

Sustainable Hydrogen PhD

Academic Year 2023/24

Awarding body	Loughborough University
Teaching institution (if different)	University of Nottingham, University of Birmingham, Ulster University. Research support may be provided by industry or other stakeholders.
Programme title	Sustainable Hydrogen
Primary award	Doctor of Philosophy (PhD) or Master of Philosophy (MPhil)
Mode of Study	Full-time and Part-time
Programme length	Full-time: 4 years Part-time: 8 years The duration of the taught component is up to 24 months from registration Submission is expected within the 4-year funded period for full time students
Owning school/department	School of Science (Chemistry – CDT lead) School of Aeronautical, Automotive, Chemical and Materials Engineering Wolfson School of Mechanical, Electrical & Manufacturing Engineering School of Business and Economics School of Social Sciences and Humanities Design School
Campus	Loughborough
Admissions criteria	https://www.lboro.ac.uk/study/postgraduate/research-degrees/
Date at which the programme specification was published	

Accreditation

None

Programme Aims

The programme will provide training that covers both the knowledge required (across Science, Engineering and Socio-Economics) and the skills development needed by the students to undertake a successful research project and to also have the skills and experiences needed across the sectors.

The training programme consists of taught development training and applied experiential learning.

The programme aims to equip students with the skills to design and carry out a research project, resulting in a thesis which will provide a contribution to knowledge and contain original work worthy of publication.

The programme will provide training in research methods appropriate to chemistry and physics fundamentals related to hydrogen generation through to utilisation; the materials science/engineering to make technologies that are compatible with hydrogen; the thermodynamics and kinetics at a science and engineering level to design materials with enhanced hydrogen properties and engineer efficient systems that deliver the performance demanded by an application; the impact assessment of a given innovation on resource critical elements or on the overall environmental benefit; united by a key technical element that is the safe operation of hydrogen technologies and systems.

This four-year programme will train graduates to generate new knowledge about sustainable hydrogen technologies encompassing the areas mentioned above.

It will be delivered through unique, robust, transdisciplinary cohort-based training and support during a four-year cycle which transforms students into leaders.

This four-year programme may involve stakeholders (industry, government research labs etc.) who will host and train students during their research part. Duration of hosting period will depend on individual projects.

Benchmarks

Relevant subject benchmark statements and other external and internal reference points used to inform programme outcomes:
The Frameworks for Higher Education Qualifications of UK Degrees
Doctoral Degree Characteristics Statement (QAA)
Credit Level Descriptors for Higher Education (SEEC)
Loughborough University Quality Reviews
Research Council Mid-term and Annual Reviews

Learning Outcomes

Knowledge and Understanding

On completion of this course, students will be expected to demonstrate competency and knowledge in all key areas (Science, Engineering and Socio-Economics) and a deep knowledge and understanding of at least one of these; competency and knowledge of at least one technical and research skill areas; and mastery of a range of professional skills including: problem solving, communication, data driven decision making, collaboration, partnerships, co-production, planning, use of ICT, data collection, data analysis, mentoring, conflict resolution, ethics in research and practice, research commercialization and securitization, entrepreneurship, marketing.

Skills and other attributes

Subject-specific cognitive skills:

See above

Subject-specific practical skills:

See above

Key transferable skills:

See above

University Regulations

University Regulations for Postgraduate Research study are set out in Regulation XXVI (Higher Degrees by Research).

Please see the Terms and Conditions of Study for detailed information on your contract with the University.

Programme structure

To ensure cohesion within and between cohorts, and to build professional skills, a structured programme of cohort support and development will be provided through an annual cycle of events which starts on day 1. Training has two primary objectives, to build the cohort network and to develop skills. Skills development will be to broaden student capabilities and will include inter alia, team building, presentation, risk management, data management, big data handling, negotiation and conflict resolution, commercial awareness, contracting and participatory development as per the Vitae Researcher Developer Framework (2010).

It is anticipated that all currently enrolled students will be together up to five times during each year of study, hosted at a partner institution: the induction and annual team building event (September), Challenge week (January), Summer conference (July), and Biannual professional networking typically May and November.

Part R0

Doctoral Researchers will complete the following:

Commence consultation with potential supervisors and industry/impact partners to identify and agree on the research topic.

120 credits in modular courses during years 1 and 2 assessed in accordance with Regulation XXI which will include:

70 credits in semester one and 50 credits in semester two in year one. If any student misses any modules for unforeseen circumstances, it should be completed in the following year, as such all 120 credits must be completed within the first 24 months.

120 credits from any of the following:

Compulsory modules: All students must complete the following modules (100 credits)

	Module title
1	SOCI4072 Energy Technology and Society (Nottingham University, 10 credits)
2	MECH/4025/01 Technologies for the Hydrogen Economy (Nottingham University, 10 credits)
3	VETS/4011/01 Research Portfolio (Nottingham University, 20 credits)
4	04 31267 Energy Systems and Policy 2 (Birmingham University, 10 credits)
5	ENE821 Principles of Hydrogen Safety (Ulster University, 30 credits)
6	ECP900 Transforming Energy Systems: Economics and Business Environment (Loughborough University, 20 credits)

Optional modules: Students may select any of the following (a minimum of 20 credits)

	Module title
1	WSD544 Energy System Investment and Risk Management (Loughborough University, 15 credits)
2	WSD531 Renewable Energy Technologies, Economics and Policy (Loughborough University, 15 credits)
3	CMP057 Separation Techniques (Loughborough University, 15 credits)
4	MANU/3011/01 Engineering sustainability (Nottingham University, 20 credits)
5	BUSI 4558 Innovation and Technology transfer (Nottingham University, 10 credits)

6	ENGR/4003/01 Energy Storage (Nottingham University, 10 credits)
7	04 19688 Materials for Hydrogen Technologies (Birmingham University, 10 credits)
8	04 24366 Materials for Sustainable Env. Tec (Birmingham University, 10 credits)
9	ENE825 Hydrogen Safety Technologies (Ulster University, 30 credits)

In the event that a student has already studied these, or equivalent modules then alternative modules may be agreed at the discretion of the Programme Director.

At the end of the first 6 months, students will have to provide the Loughborough University CDT Management Board a brief report outlining the progress. This report contains two parts; the first part (one A4 page) should outline the progress made on completion of taught modules and the second part (one A4 page) should include the progress made on the research project. This two-page report will be assessed by the Loughborough University CDT Management Board.

The assessment will be based on the performance of the students undertaking CDT modules, progress made in research project, skills training and other relevant activities. Recommendations made by the CDT Management Board in accordance with the provisions of regulation XXVI will go to School Progress Review Boards. The Loughborough University CDT Management Board will provide brief feedback to each student and their supervisor(s). This feedback will be recorded in co-tutor under the relevant student by the primary supervisor.

At the end of year one, candidates are required to pass at least 120 credit equivalent taught elements, and to have made substantial progress on the identification of a PhD research topic in close collaboration with supervisors and if applicable the project external stakeholders (e.g. industry, government labs).

In addition, students will have to write a review article to a suitable peer-reviewed journal which is broadly in the area of the students' research project. The expectation is that either the article is submitted or ready to be submitted. This review article along with an update on the progress made in research project, skills training and other relevant activities, should be submitted to the Loughborough University CDT Management Board.

Recommendations made by the CDT Management Board in accordance with the provisions of regulation XXVI will go to School Progress Review Boards. Feedback will be provided to each student and their supervisor(s) via the relevant school Postgraduate administration (e.g. SCI-PGR). This feedback will be recorded in co-tutor under the relevant student by the primary supervisor.

Students will also complete compulsory training events; annual team building; YES competition; annual conference.

Part R1

Doctoral Researchers will complete the following:

Students will continue PhD research under the direction of their assigned supervisors.

If not completed in R0, candidates are required to pass at least 120 credit equivalent taught elements in accordance with Regulation XXI.

Students will also complete compulsory training events; annual team building; YES competition; annual conference.

Progression assessment
Submission of a 1000-word research report at 6 months for part-time Doctoral Researchers.

Submission of a 2,000-word research report at the mid-way point of Part R1 and submission of a satisfactory 10,000-word research report (end of Part report) towards the end of Part R1 in accordance with the provisions of Regulation XXVI.

Typically, the timetable for reports in R1 will follow the schedule below.

Time spent in R1	6 months	12 months	24 months
Full-time	2,000-word mid-part report	10,000-word end of part report	

Part-time	1,000-word research report	2,000-word mid-part report	10,000-word end of part report

Part R2

Doctoral Researchers will complete the following:

PhD candidates: Submission of a mid-part review for part time Doctoral Researchers, and a satisfactory 10,000-word research report (end of Part report) towards the end of Part R2 in accordance with the provisions of Regulation XXVI.

Typically, the timetable for reports in R2 will follow the schedule below.

Time spent in R2	12 months	24 months
Full-time	10,000-word end of part report	
Part-time	Mid-part report	10,000-word end of part report

MPhil candidates: Submission of their formal MPhil thesis for examination in accordance with the provisions of Regulation XXVI at the end of part R2.

Part R3

Doctoral Researchers will complete the following:

Submission of a mid-part report for part-time Doctoral Researchers.

At the end of R3, submission of a formal PhD thesis for examination in accordance with the provisions of Regulation XXVI.

Typically, the timetable for reports in R3 will follow the schedule below.

Time spent in R3	12 months	24 months
Full-time	PhD submission	
Part-time	Mid-part report	PhD submission

Criteria for Progression and Degree Award

To progress from Part R0 to R1, Part R1 to Part R2 and from Part R2 to Part R3, and to be eligible for an award, candidates must satisfy the assessment requirements set out in Regulation XXVI. Candidates must complete all the requirements for each Part outlined above in order to progress to the next Part. If an end of part report does not meet the standards required for progression, candidates may undertake further work and resubmit the report on one occasion only in accordance with the provisions of Regulation XXVI.