



The Faraday Institution PhD Training Programme Course Guide

2023/2024

Powering Britain's Battery Revolution

PhD Training Programme Overview 2023/24





Faraday Institution PhD Researchers attending the Faraday Institution conference 2023.



Creating a dynamic and diverse pool of talent for the fields of battery technology and energy storage

The Faraday Institution is actively committed to attracting, nurturing and empowering a dynamic and diverse pool of talent for the fields of energy storage and battery technology that can creatively tackle the challenges facing society today. Central to this is increasing the knowledge, skills and aspirations of researchers early on in their careers. Wellbeing is a key pillar of our training programme (see page 25).

Developing the UK battery value chain will need trained, industry-ready PhD researchers in increasing numbers to improve upon existing technologies and processes and to conduct R&D to invent next generation batteries. The Faraday Institution PhD Training Programme is designed to skill researchers for future battery related careers in academia, industry and policy making as well as actively boost researcher professional identity to maximise career success.



"Empowering tomorrow's leaders, the Faraday PhD Training Programme provides PhD researchers with cutting-edge training, propelling them to successful careers in the UK battery sector which is positively contributing to creating a more sustainable future."

Dominic Grantley-Smith, Training Manager, Faraday Institution

<u>Meet our Faraday Institution cohorts</u> and <u>view a video</u> to learn about the PhD researcher successes.

Faraday Institution PhD Training Programme Overview - 2023/24

For this academic year, a combination of in-person and online training has been planned.

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Please save the dates. The expectation is that Faraday Institution PhD researchers attend all the training for their year group and full participation is required. In the rare instance that there are unforeseen circumstances, please contact training@faraday.ac.uk at the earliest convenience to discuss. Further details about each training session will be provided in due course. Please do not make travel arrangements until this is received as dates and timings are subject to minor changes.



The Faraday Institution PhD training is mapped to the <u>Vitae Researcher</u> <u>Development Framework</u> and follows best practice as outlined in the Vitae Researcher Development Concordat (2019).

Faraday Institution Year 1 PhD Programme - 2023/2024

Welcome to the Faraday Institution's PhD programme in energy storage. The Faraday Institution aims to prepare its PhD research community for battery related careers in academia, industry, policy making and more, where they can not only participate in one of the most exciting research moments of our generation, but also be prepared to lead in the future. Faraday Institution PhD researchers will have access to networking opportunities, industry visits, mentorship, internships, as well as quality experiences that will further develop knowledge, skills, and aspirations. Further, participants in this programme will work on Faraday Institution research projects, alongside some of the best scientists and engineers in the UK, to solve pressing challenges in batteries and energy storage.

This programme of bespoke battery-related courses, delivered by experts in the field, ensures PhD researchers are equipped with the in-depth knowledge and skills needed to maximise the potential of their research projects. The programme includes week-long training modules such as the "Newcastle Battery School" and "WMG Battery School", as well as a range of battery-related industry talks. Industry tours include visits to national facilities such as the Science and Technology Facilities Council at Harwell. This training will provide PhD researchers with valuable insights into the application of battery technologies across the sector.



Faraday Institution PhD Researchers taking part in WMG battery school, February 2023.

Monday 9th – Friday 13th October 2023

This is an opportunity to learn more about training plans for the year abead. It also This is an opportunity to learn more about the Faraday Institution and the exciting training plans for the year ahead. It also enables the Faraday Institution to get to know each PhD researcher and understand their individual career aspirations. A video call will be scheduled with each participant.

Monday 16th October 2023 14:00 - 15:00 Introductory Cohort Call, online

A chance to meet the rest of the cohort and learn more about the Faraday Institution

Wednesday 1st - Friday 3rd November 2023 Harwell Science Campus, Didcot, Oxfordshire

Introduction to the Faraday Institution, in-person

Meet the FIHQ team to learn more about the organisation and the Faraday Institution research project portfolio.

WAE Talk and Tour

Gain industry insights from the team at WAE that is involved in a multitude of electrification projects from dumper trucks to Formula E. The Formula E battery was developed at WAE and participants will be able to discover more about how it propels cars to high speeds, whilst maintaining practicality in safety, aerodynamics, range, and recharging times. Also hear about what a role as a battery engineer entails.



A Fortescue Company



Faraday PhD researchers touring WAE. November 2023.

Friday 3rd November 2023 STEM Ambassador Training 1, in-person with Dr Elizabeth Driscoll (University of Birmingham)

and Dominic Grantley-Smith (Faraday Institution)

STEM (Science, Technology, Engineering, Maths) Ambassador training will equip PhD researchers with the skills to share their research in relatable and engaging ways to a range of audiences, including young people. The aim is to inspire the next generation to consider careers in the field of energy storage and battery technology as we look to build a sustainable future.

This will include exploring the <u>Faraday Fully Charged Battery Box</u> and other resources developed for <u>STEM outreach</u>.



Elizabeth Driscoll conducting outreach at a primary school.

Sunday 19th - Thursday 23rd November 2023 Newcastle Battery School, in-person Hosted by Newcastle University & Zero Carbon Futures

Lithium-ion batteries have become the industry standard for rechargeable batteries due to their high energy densities, long life, and competitive prices. They do, however, come with safety issues as they contain flammable materials that may combust when cells fail. While safety protocols and risk mitigating processes are increasingly successful at avoiding failure, lithium-ion battery fires and accidents do occasionally occur, which is why a better understanding of the fundamentals of battery technology is essential to mitigate future incidents.

This course seeks to take its attendees, coming from a broad range of expertise and experience, through the science that underlies lithium-ion technology, including how the battery influences external factors such as charging infrastructure and driver behaviours. It includes information from basic electrochemistry to module integration, battery system operation, typical methods employed to monitor and maintain system health, as well as the hazards and risks associated with incorrect battery management.

The North-East is a hub for lithium-ion battery cell manufacture. PhD researchers will visit Turntide and see the production of electric vehicles at the Nissan UK plant. "It's the true wonder of science that can get people excited and get people to aspire."

Dr Maggie Aderin-Pocock, Space Scientist

Year 2 Faraday Institution PhD researchers will be in Newcastle at the same time creating networking opportunities.

Faraday Institution PhD Researchers taking part in Newcastle Battery School, November 2022.



Sunday 11th – Thursday 15th February 2024 WMG Battery School, in-person University of Warwick

<u>WMG</u> (Warwick Manufacturing Group) will be sharing the knowledge and expertise of their world-class research and teaching staff. Delegates will learn about battery cell production through lectures, live discussions and practical lab sessions from the state-of-the art battery, materials and pilot line facility.



Faraday Institution PhD Researchers taking part in WMG battery school, February 2023.

Monday 4th March 2024, 14:00 - 16:00 STEM Ambassador Training Call, online

This call serves as an introduction to preparation tasks ahead of Faraday Institution PhD researchers presenting to schools.

Tuesday 12th March – Thursday 14th March 2024 STEM Ambassador Training 2, in-person Dr Elizabeth Driscoll (University of Birmingham) and Dominic Grantley-Smith (Faraday Institution) Harwell Science Campus, Didcot, Oxfordshire

This two-day STEM Ambassador training course culminates with attendees presenting their research in creative, age-appropriate ways, to inspire pupils in schools about the race to electrify the UK whilst raising STEM career aspirations. What better time to enthuse the next generation than <u>British Science Week</u>!



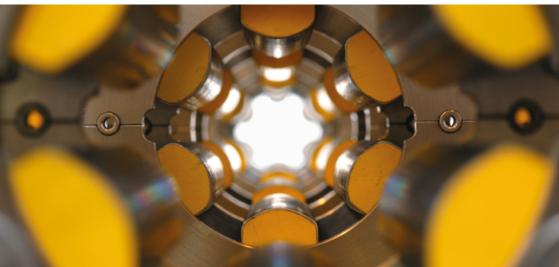
Tours of Harwell Science & Innovation Campus

The programme includes visits to research facilities on the Harwell Science & Innovation Campus:

Diamond Light Source is the UK's national synchrotron and is one of the most advanced scientific facilities in the world. Its pioneering capabilities are helping to keep the UK at the forefront of scientific research. Faraday Institution Research Fellows use beamlines here as part of their battery research.

ISIS Neutron and Muon Source is a world-leading centre for research at the STFC Rutherford Appleton Laboratory. The suite of neutron and muon instruments give unique insights into the properties of materials on the atomic scale.

Storage ring sextupole magnet - Copyright of Diamond Light Source Ltd 2020.



Faraday Institution Year 2 PhD Programme – 2023/2024

Energy storage technologies are at the centre of a global research and development race. The uptake of these disruptive technologies will have a significant impact on the marketplace, policy making, economics, and supply chain resource availability.

The prevailing theme of the Faraday Institution's second year of PhD programming is a "mini MBA" on energy storage and entrepreneurship. The principal objective is to prepare our researchers with the knowledge and skills required to contextualise the global, industrial, and policy aspects of energy storage in which their research can make an impact. Further, the training looks to give researchers the necessary skills to become leaders in their own right—in academic, industrial, governmental and entrepreneurial settings—for the benefit of the researcher and the UK.

Specific courses include personal development and strength identification, presentation skills, negotiations, leadership development, R&D project management, energy policy making, and entrepreneurship.



Rob House showing FUSE interns around the new lab at the University of Oxford, August 2023.

Monday 16th October 2023 15:00 - 16:00 Introductory Cohort Call, online

A chance to meet the rest of the cohort and learn more about the Faraday Institution.

Sunday 19th - Thursday 23th November 2023 Mini MBA Week 1, in-person

Newcastle

Myers Briggs Personality Profiling, with Kindred

How do we get the best out of ourselves and others?

Aims: To understand self and others better to benefit interactions and outcomes.

Learning objectives:

- Participants will discuss the theory of MBTI® (Myers Briggs Type Indicator) and what it reveals about the way they see and interact with the world
- They will identify their own personality preferences, those of others and how that can affect their interactions, decision making and actions
- They will learn where their preferences are a strength and can create challenge
- They will gain strategies to better equip them to make decisions and improve how they communicate, collaborate and build relationships with others



kindred

Helping you communicate and connect

Dynamic Presenter Training, with Body Talk

Participants will benefit from advanced techniques to increase their personal influence to give greater respect, build stronger relationships and grow rapport with the people with whom they work. These are skills that are transferable for academic and industry careers. This workshop, comprising sessions on theory, personal coaching, and purpose, offers tools to be more effective in daily interactions.

Participants will be coached in delivering their knowledge and scientific content in an engaging and compelling way to a variety of different audiences.

Topics covered will include:

- Dynamic and engaging communication
- Presenting with confidence
- Making scientific content and slides more engaging
- Storytelling
- Engaging different audiences

Workshops, small group coaching sessions and assigned tasks will ensure personalised feedback and individual participant skills development. "Science is not finished until it is communicated."

Professor Sir Mark Walport, former UK Chief Scientific Advisor



Project Management: Your PhD and Beyond online, with Skillfluence

This interactive workshop will explore the practical application of project management to research projects. Working through a project lifecycle we will explore:

- Engaging with collaborators and stakeholders to define project success
- Effectively planning projects considering the nature of research
- Pre-empting issues and risk management of the project
- Assessing the progress and resolving issues

Throughout the workshop the trainer will discuss how these skills can be applied to research as well as beyond academia.







Industry Tours

The North-East is a hub for lithium-ion battery cell manufacture. Industry tours are planned to showcase the commercialisation of lithium-ion batteries at AESC as well as a tour to CPI research facilitate where they look at scaling up battery research.



There will be opportunities to network with the Year 1 Faraday Institution PhD researchers.

Faraday Institution PhD researchers visiting AESC, November 2022.

Sunday 11th – Friday 15th February 2024 Mini MBA Week 2, in-person University of Warwick

A week of skills development, industry workshops and a tour to UKBIC.

Industry Tours and Workshops

An opportunity to explore the battery-related industries in the Midlands as well as hear about careers and job opportunities in the battery industry more widely.

"The massive investment in the battery industry is unprecedented." Robert Llewellyn, The Fully Charged Show This will include a visit to:

The UK Battery Industrialisation Centre, (UKBIC) the national manufacturing development facility providing UK battery manufacturing scale-up and skills to support the transition to an electrified future.

Engaging workshops from:

<u>Benchmark Minerals Intelligence</u>, that assess market prices as well as provide data forecasts and supply chain intelligence for lithium-ion batteries and rare earth elements.

<u>Exawatt</u> / <u>CRU</u>, that provide in-depth coverage of the automotive market, focusing on short- and long-term EV demand forecasts.

Agratas' battery team will speak about their roles in electrification and scale up, as they build two gigafactories (UK and India) for their two anchor customers Jaguar Land Rover (JLR) and TML, as well as about internship and career opportunities.



The proposed view of the new Agratas gigafactory

<u>Echion</u> is a leading battery materials company specialising in the development and supply at gigawatt-hour scale, of lithium-ion anode materials based on niobium. The company will provide an overview of the science and potential careers in the organisation.









Negotiation Skills, with Institution of Mechanical Engineers (IMechE)

Researchers negotiate as part of everyday life, whether on the price of lab equipment, a pay rise or an extension to a deadline. This programme has been designed to provide researchers with an opportunity to learn tools and techniques for negotiating in a variety of internal and external scenarios. The course provides an opportunity for participants to practise these new skills and receive feedback on negotiation styles and preferences. Participants will leave the programme with a renewed confidence in seeking win-win outcomes in negotiations.

Getting Social: A Guide to Social Media for Researchers,

with Skillfluence

A workshop that constantly evolves to consider the fast-moving nature of social media and that features up to date case studies and examples. Getting work on social media may be easy, but ensuring it is used to effectively promote the latest research and boost ones' professional researcher identity, is more challenging. This workshop takes participants through the main social media channels and looks at how to create short, sharp, sharable messages that foster meaningful interactions, grow their network and boost their researcher identity online.

What the course will cover/learning outcomes:

- Using social media as a research tool
- Raising researcher identity with social media
- How to use LinkedIn effectively
- How and who to connect with



Sunday 21st - Friday 26th April 2024

Mini MBA Week 3 in-person

Imperial College London

What's the Market Opportunity for my Research? with Imperial College London

Going from an Idea to a Business Model

This workshop will explore the techniques needed to take a potential business idea and turn it into an effective business model. Topics will include:

- Creating a business model canvas
- Explaining the difference between market-pull and technology-push
- Recognising different types of innovations
- Designing a product or service that could be a potential business
- Analysing the competitive environment of your business
- Analysing and evaluating your business model canvas

"Starting and growing a business is as much about the innovation, drive, and determination of the people behind it as the product they sell." Elon Musk

Commercialising your Business Model

Participants will have the opportunity to create a business model canvas to explore how their ideas will work as a potential business.

- Designing your own business models
- Systematically understand, design and differentiate new business models
- · Facilitate innovative ideas for novel products and services
- Differentiate between product and business model innovation
- Rapid prototyping of business models
- Understand principles of marketing, competitive advantage for new business models
- Basics of entrepreneurial finance and introduction to financial forecasting template

YEAR 2

How to Run a Research Lab

The role of a research leader involves many different aspects from managing a lab, ensuring that health and safety is maintained, to promoting the work of the group and growing the people they manage. This workshop will give individuals the skills, insights and tools they need to effectively lead a research lab and group.

On completion of this module, participants will have considered:

- Funding related responsibilities
- Frameworks for industrial collaboration
- Pathways to impact
- Articulating research challenges and visions
- Conflict resolution
- Health and safety
- Group management and growth
- Social media
- Career development



Faraday Institution Researchers using a digester at the University of Birmingham, August 2022.

Faraday Institution Year 3 PhD Programme – 2023/2024

Equipping Faraday Institution PhD researchers with the knowledge and expertise needed to embark on successful careers (whether in academia, industry or policy making) is a key aim of the programme. At the heart of the Year 3 training is the development of the skills needed to <u>secure and undertake a valuable</u> <u>internship</u>.

Monday 9th October 2023 Cohort Call, online, 14:00 - 15:00

A chance for the cohort to hear plans for training in the coming year.

October - November 2023 Career 101

Individual coaching calls for each of the Year 3 Faraday PhD researchers along with their supervisor and one of the Faraday Institution Education Team. A chance to have a personalised review of their career development goals.



Faraday Institution PhD Researcher working at Elysia, part of WAE, after completing an internship there. May 2023.

Thursday 26th October 2023

How to Gain Trust, Rapport and an Internship, online, with Kindred

Faraday Institution PhD researchers have access to many industry contacts and are expected to facilitate their own internships. Their challenge lies in how to strike the right tone with their initial contact and how to confidently turn their first conversation into one of trust, rapport and the foundation of a good relationship, ultimately resulting in an offer.

The training comprises a range of whole group sessions, set tasks with written feedback and small group coaching.



Faraday Institution PhD Researcher at University of Oxford, August 2023

Thursday 16th November 2023

Interview Training, online, with Kindred

Having established connections in industry, Faraday Institution PhD researchers will face interviews for internships or jobs. While comfortable in their field of expertise, researchers also need a host of 'soft skills' to make the right impression on interviewers in a short time, potentially on a remote platform.

This training addresses the challenges of communicating comfortably and professionally both in-person and on camera and also those typical interview challenges of nerve handling, not feeling authentically 'you', feeling stumped by a question, having nothing to say, or having too much to say.

The training day will include small group coaching to enable each participant to receive personalised guidance on their interview technique.

Thursday 18th January 2024

How to Complete Your PhD on Time, online, with Skillfluence

Participants learn a combination of project management, productivity and time management skills and methods applied specifically to the challenge of completing a high-quality PhD thesis on time with minimal stress and anxiety.

The workshop addresses 'big picture' issues as well as providing specific productivity 'tips and tricks'. Participants will leave the workshop with increased confidence and optimism about completing their PhD thesis on time.

Specific areas to be covered include:

- Starting well
- Designing for success
- Organising for efficiency
- Project management
- Potential risk factors
- Understand the key steps in the process
- Time management essentials

Wednesday 31st January - Thursday 1st February 2024 Harwell, Oxfordshire

Networking Dinner, in-person

A chance to network with Year 4 PhD researchers and Faraday Institution head office staff.



Faraday Institution PhD Researcher at the Faraday Networking Dinner, February 2023.

Fellowship and Grant Writing, with Scriptoria

Scriptoria's course in Fellowship and Grant Writing is aimed at PhD researchers who are looking to build their track record and fund their independent research by winning their first small awards, fellowships and project grants.

During the course, attendees cover how to generate ideas and turn them into a written proposal that is interesting and easy for reviewers to understand. Throughout, real-life examples from relevant topics in battery research are incorporated to complement the theory. Established researchers from the Faraday Institution network will join the session to share their insights and answer questions. The course also covers a host of practical tools for brainstorming, assessing risk, creating work plans and drafting budgets.

By the end of this course, participants will be able to:

- 1. Understand the proposal review process and the reviewing audience
- 2. Effectively manage a collaborative proposal writing process
- 3. Understand the requirements for each section of a proposal
- 4. Understand the key differences between criteria for fellowships and research grants
- 5. Draft a compelling and concise proposal abstract and text
- 6. Write convincingly about research impact
- 7. Use brainstorming tools to generate ideas and evidence
- 8. Assess and mitigate risk
- 9. Understand the requirements for a project budget
- 10. Refine ideas and writing for a less technical audience

Wednesday 6th March 2024

Thesis Writing, online, with Skillfluence

The course aims to help early career researchers improve the organisation, clarity, and style of their scientific writing. The course covers how to plan, develop and produce a well-written research thesis – with additional tips on how to adapt writing for journal articles.

The focus is placed on the writing skills that PhD researchers need to succeed: writing concisely, writing precisely, and using good style to engage an audience. The course also teaches participants the formal writing cycle (the process by which professional writers tackle a writing project), including how to properly edit and proofread text. Finally, several practical tips for using Microsoft Word and reference manager software are discussed, to make the writing process more efficient.

Topics covered include:

- What makes a good PhD thesis
- Critiquing thesis text
- Effective data presentation
- Writing clearly and avoiding common errors
- Improving your style and keeping your audience interested
- The writing and editing cycle
- Time-saving techniques in MS Word





Faraday Institution Year 4 PhD Programme – 2023/2024

The Faraday Institution PhD Training Programme is front loaded with more sessions taking place in early years. Therefore, the training schedule at this stage is lighter. The focus of Year 4 is centred on individual study, completion of a quality thesis and preparation for the transition to the next career stage. Celebrating successes will also lie at the heart of the year.

Monday 9th October 2023 Cohort Call 15:00 – 16:00, online

A chance for the cohort to hear plans for training in the coming year.

Wednesday 15th November 2023

CV writing workshop, online

The workshop will enable a researcher to develop a quality CV to showcase skills and experience, in readiness for securing a role post PhD. This includes working with a career coach to learn how to best convey suitability for a role.

Tuesday 28th November 2023, online

CV 1:1 Feedback session, online

Following the CV workshop, all attendees will have 1:1 feedback and coaching on their CVs to maximise the impact.

Wednesday 31st - Thursday 1st February 2024

Harwell, Oxfordshire

Networking Dinner, in-person

This provides a chance to meet with Year 3 PhD researchers and Faraday Institution head office staff to strengthen connections and expand networks.

Transitioning from PhD to postdoc and industry roles

This is an opportunity to hear from those who are in the next stage of their careers who will share their personal stories. Researchers will learn how to best prepare and gain an appreciation of the challenges and rewards of the next career stage.

23

2nd May 2024, online Mock Interviews with Industry Partners

The mock interview training aims to equip participants with the necessary skills and confidence to excel in job interviews. Through simulated interview scenarios and constructive feedback, participants will enhance their communication, and presentation abilities.

Battery industry experts from across the Faraday Institution community will provide a mock interview experience to prepare PhD researchers for a career post PhD.

Faraday Institution Researchers at the University of Sheffield, August 2022

Autumn 2024 (Date and location to be confirmed) Graduation Celebration, in-person

The Faraday Institution invites the cohort to attend this special event to showcase the achievements of cohort 3 of the Faraday Institution PhD Training Programme. Attendees, their supervisors, and invited guests will hear stories of research impact, internship adventures and more.



Faraday Institution Graduation Celebration in June 2022 at the Royal Society.



Additional training opportunities

Monday 19th February 2024

An opportunity for Faraday Institution PhD researchers to run local attraction events for undergraduate students at their universities that showcase battery technology careers and the sector in general. An opportunity to get creative, inspire others, partner with university societies, career advisors and lectures.

In addition, the Faraday Student Committee will host an <u>online event</u> to ensure wide participation and spotlighting of the opportunities in the battery sector and careers that can help find pioneering solutions to the challenges faced in creating a sustainable future.

Tuesday 26th - Wednesday 27th March 2024

Faraday Institution Early Career Researcher Conference and Training Event at Warwick Conference Centre

The Faraday Institution's Early Career Researcher Conference and Training Event is designed by early career researchers for early career researchers. It is an opportunity to join around 300 peers to network, learn, contribute and take action together. The event consists of:

- Keynote lectures
- Research talks
- Interactive break-out sessions
- Insight from fellow researchers
- Training sessions
- Career development opportunities



The Faraday Institution's Early Career Researcher Conference at the University of Warwick, autumn 2022.

Tuesday 10th September – Thursday 12th September 2024 Faraday Institution Annual Conference 2024 at Newcastle University

The 2024 conference welcomes participants from across the battery energy storage research, development and innovation ecosystem to attend, from the UK and beyond – whether working in academia, industry or policy. Whether you're directly involved with Faraday Institution projects or not, Join us as we grow our community.

Faraday Masterclasses, online

Hear from experts in the fields of battery technology and energy storage. Recordings of past sessions are available on the <u>Faraday Institution website</u>.

PhD Researcher Health and Wellbeing

We care deeply about the wellbeing of our PhD researchers and acknowledge that undertaking a PhD can present challenges.

We commit to:

- provide training on time management and successful thesis writing
- have 1:1 coaching calls (as outlined in the training guide). Additionally, there is the option for the training budget to pay for a few sessions of professional career coaching if required
- provide details in advance of training
- schedule regular breaks and quiet zones on training days and conferences as far as is practicably possible
- make all reasonable accommodations to enable full participation at training events or provide alternative options if indicated
- provide prayer spaces, where requested

- ensure dietary requirements are catered for
- work with accessibility and EDI consultants to adopt best practices to create inclusive training environments
- connect PhD researchers with the wider Faraday Institution community and industry partners
- provide high-quality training that will set individuals up for career success
- select trusted, professional training partners
- access to Mental Health First Aider at Faraday HQ
- ensure the Faraday Institution <u>Code of</u> <u>Conduct</u> and <u>EDI Charter</u> are followed

"To produce world-class research, we must provide a healthy and supportive research environment that allows researchers to flourish." Vitae 2018



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