The Faraday Institution
PhD Training Programme
Course Guide

2021/2022

POWERING BRITAIN’S BATTERY REVOLUTION
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.

“The need for breakthroughs in energy storage research is evident as the UK races to lead the transition to fully electric. We are committed to nurturing the talent and developing the skills of the community who will lead this effort.” Professor Pam Thomas, CEO, Faraday Institution

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

Faraday Institution
PhD Training Programme Overview - 2021/22

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

A range of battery-related industry talks provide PhD researchers with valuable insights into the application of battery technologies. These include insight about the research focused work of Nissan, research facilities at Warwick Manufacturing Group (WMG), Diamond Light Source as well as ISIS Neutron and Muon Source.

“Professional and career development are integral to enabling researchers to develop their full potential.” Researcher Development Concordat 2019*
Monday 11th – Friday 15th October 2021
Welcome Interview Video Call, online (compulsory)
with Fran Long, Education and Training Lead

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 during this week.

Monday 18th October 2021 13:30 – 14:30
Introductory Cohort Call, online (compulsory)
A chance to meet the rest of the cohort and learn more about the Faraday Institution.

Wednesday 3rd – Thursday 4th November 2021
Harwell Science Campus, Didcot, Oxfordshire, OX11 0RA
Introduction to the Faraday Institution, in-person (compulsory)
Meet the CEO Professor Pam Thomas and the FIHQ team to learn more about the organisation and the Faraday Institution research project portfolio.

Williams Advanced Engineering Talk and Tour
Gain industry insights from Rob Millar, Head of Electrical and Battery Systems at Williams Advanced Engineering and Expert Panel Member at the Faraday Institution. The Formula E battery was developed at Williams Advanced Engineering and participants will be able to discover more about how it propels cars to high speeds, yet still needs to be practical in terms of safety, aerodynamics, range and recharging times. Also hear what the role of a battery engineer entails.
STEM Ambassador Training 1, in-person (compulsory)
with Fran Long (STEM engagement specialist) and Claire Hamnett
(Science Learning Partnership)

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,
with the aim of inspiring the next generation to
consider careers in the field of energy storage
and battery technology as we look to building
a sustainable future.

This will include exploring the ‘Faraday Fully
Charged Battery Box’ of resources for STEM
outreach created in collaboration with the
Curiosity Box.
Sunday 28th November – Friday 3rd December 2021

Newcastle Battery School, in-person (compulsory)

Hosted by Newcastle University & Zero Carbon Futures

Due to their high energy density, long life, and competitive price lithium-ion batteries have become the industry standard. However, they contain flammable materials and can 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. 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. 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 at Envision AESC and the production of electric vehicles at the Nissan MUK plant and with the development of a new gigafactory by Britishvolt. Industry tours are planned to showcase the commercialisation of lithium-ion batteries.

“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.
Monday 28th February – Friday 4th March 2022
WMG Battery School, in-person (compulsory)

University of Warwick, Scarman Rd, Coventry CV4 7SH

WMG will be sharing the knowledge and expertise of their world-class research and teaching staff. Delegates will learn about battery cell production through lectures, discussions and practical lab sessions from the state-of-the-art battery, materials and pilot line facility.

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

Wednesday 9th March 2022, 14:00 – 16:00
STEM Ambassador Training Call, online (compulsory)

An introduction to the preparation tasks ahead of Faraday Institution PhD researchers presenting to schools.
Wednesday 16th March – Thursday 17th March 2022

STEM Ambassador Training 2, in-person (compulsory)

with Fran Long (STEM engagement specialist) and Claire Hamnett (Science Learning Partnership)

Harwell Science Campus, Didcot, Oxfordshire, OX11 0RA

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 and develop the next generation of batteries whilst raising STEM career aspirations. What better time to enthuse the next generation than British Science Week!

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.

“The massive investment in the battery industry is unprecedented.”
Robert Llewellyn, The Fully Charged Show
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 has the opportunity to 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.

**Tuesday 28th and Wednesday 29th September 2021**

**Cohort Building Event, in-person** (compulsory)

**Harwell Science Campus, Didcot, Oxfordshire, OX11 0RA**

A first opportunity for the cohort to meet face to face. Talks from Matt Howard, Chief Strategy Officer and the FIHQ team about the Faraday Institution aims and research portfolio. To also include facility tours:

**Tours of Harwell Science & Innovation Campus**

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Team building

**Fitness at the Farm**, Collins Farm, Kingston Road, Frilford, Oxfordshire, OX13 5NX

A chance for the cohort to work together in this fun session that includes team challenges and a scavenger hunt (suitable for all abilities).

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**Sunday 28th November – Thursday 2nd December 2021**

**Mini MBA Week 1, in-person** *(compulsory)*

Crowne Plaza, Stephenson Quarter, Hawthorn Square, Forth Street, Newcastle upon Tyne, NE1 3SA

**Myers Briggs Personality Profiling**, with **Kindred**

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

Aims: To understand yourself 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

“Knowing yourself is the beginning of all wisdom.” Aristotle, Greek Philosopher
Dynamic Presenter Training, with Body Talk

Participants will benefit from learning advanced techniques to increase their personal influence in order 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.

Industry Tours

The North East is a hub for lithium-ion battery cell manufacture at Envision AESC and the production of electric vehicles at the Nissan MUK plant, and with the development of a new gigafactory by Britishvolt. Industry tours are planned to showcase the commercialisation of lithium-ion batteries.

"Believe in yourself, and make other believe in you and your ideas.” Baroness Karren Brady, Business Leader

Copyright Nissan Envision AESC
Monday 28th February – Friday 4th March 2022  
Mini MBA Week 2, in-person (compulsory)  
University of Warwick, Scarman Rd, Coventry CV4 7SH  
A week of lab workshops, industry tours and talks plus in-depth training days.

WMG Battery School Lab Sessions  
To include coin cell fabrication, cell and module testing and forensics.

Industry Talks and Tours  
An opportunity to visit industry settings in the Midlands as well as hear from a range of industry partners and organisations such as Jaguar Land Rover and the UK Battery Industrialisation Centre (UKBIC).

“Few inventions have changed our lives as much as the battery. I’m excited that more inventors and investors are being attracted to the quest to build a better one.” Bill Gates, Entrepreneur & Philanthropist
Negotiation Skills, 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 take into account the fast-moving nature of social media and that features up to date case studies and examples. Ensuring it is used effectively to promote the latest research and boost ones’ professional researcher identity is a key skill. 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 your network and boost your researcher identity online.

What the course will cover/learning outcomes:

• Using social media as a research tool
• Raising your researcher identity with social media
• LinkedIn and Twitter
• How and who to connect with

“Science is not finished until it is communicated.”
Professor Sir Mark Walport, former UK Chief Scientific Advisor
Monday 25th – Friday 29th April 2022

Mini MBA Week 3 in-person (compulsory)

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

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

“I find out what the world needs, then I go ahead and try and invent it.”

Thomas Edison, Inventor
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

“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, Technology Entrepreneur

Thursday 12th May 2022

Project Management: Your PhD and Beyond, online (compulsory)

with Skillfluence

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

- How to work with collaborators and stakeholders to define project success
- How to effectively plan projects taking into account the iterative nature of research
- How to pre-empt issues and risk manage the project
- How to assess progress and resolve issues with the project.

Throughout the workshop we will discuss how these skills can be applied to research or to future projects that participants may undertake both within and beyond academia.
Faraday Institution
Year 3 PhD Programme – 2021 / 2022

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 secure and undertake a valuable internship.

Thursday October 7th 2021

Cohort Call 14:00 – 15:00, online (compulsory)
A chance for the cohort to hear plans for training in the coming year.

October - November 2021

Career 101 (compulsory)
Individual coaching calls for each of the Year 3 Faraday PhD Researchers along with their supervisor and the Faraday Institution Education and Training Lead, to have a personalised review of their career development goals.

Thursday 14th October 2021

How to Complete Your PhD on Time, online (compulsory)
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
Monday 1st November 2021

How to Gain Trust, Rapport and an Internship, online (compulsory) 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.

Monday 22nd November 2021

Remote Interview Training, online (compulsory) with Kindred

Towards the end of their PhDs researchers will need to prepare for interviews for internships or jobs, which may be conducted remotely or in person. While comfortable in their academic field, researchers need a host of ‘soft skills’ to make the right impression on interviewers in a short time, possibly using an online platform. The training provided by Kindred addresses the challenge of communicating comfortably and professionally on camera as well as typical interview challenges of handling nerves, 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.
Tuesday 18th (pm) and Wednesday 19th January 2022

Networking Dinner with Year 4 PhDs Researchers, in-person (Harwell)
A chance to catch up with peers and share PhD progress.

Thesis Writing, in-person (Harwell) (compulsory)

with Skillfluence

Participants will gain practical skills to support them with the complex and sometimes daunting task of starting to write. From understanding how to get started, learning about different formats and writing styles and completing written work.

Topics covered include:
• What makes a good PhD thesis
• Storytelling
• Planning and time management
• Style essentials
• Writing hacks
• Goal setting

“All scientists must communicate their work, for what is the point of learning new things about how the world works if you don’t tell anyone about them?”  Jim Al-Khalili, Professor of Theoretical Physics
Tuesday 29th and Thursday 31st March 2022

Successful Grant Writing, online (compulsory)

with Skillfluence

This workshop is designed to help researchers consider and construct all of the components of a successful grant application to enable them to confidently bring components together and progress to full submission. This is ideal for early career researchers though the framework can be applied to any grant application submission including multi-partner bids. Participants can use this opportunity to write a new proposal, or can apply it to their current research to deepen their understanding of best practice. Participants will:

• Uncover the 10 key features of a successful grant application.
• Frame their high-level research concept with impact embedded at the heart of the design.
• Use their research plan to identify and bring on board new stakeholders and meaningful co-created partnerships.
• Design specific and measurable research outputs using KPIs and consider the legacy and sustainability of their research beyond the grant lifecycle.
• Use templates to translate their visual plan into successful grant applications and break down the plan into micro actions to aid completion with time to spare before the deadline.
Completion of a quality thesis and preparing for the transition into the next career stage are the focus of the Year 4 programme. Celebrating successes will also lie at the heart of the year.

**Thursday October 7th 2021**

**Cohort Call 15:30 – 16:30, online (compulsory)**

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

**Thursday October 7th 2021**

**CV Writing Workshop, online (compulsory)**

This workshop covers crafting a quality CV to showcase skills and experience in readiness for securing a role post PhD. Participants will work with a career coach to learn how to best convey suitability for a role. Following the workshop, attendees will have 1:1 feedback and coaching on their CVs to maximise the impact.

**Tuesday 18th (pm) and Wednesday 19th January 2022**

**Networking Dinner with Year 3 PhDs Researchers, in-person (Harwell)**

A chance to catch up with peers and share PhD progress.

**Transitioning from PhD to Postdoc and Industry Roles**

A chance to hear the stories of those who have gone before. Learning how to best prepare and gaining an appreciation of the challenges and rewards of the next career stage.

“The best way to predict the future is to create it.” Abraham Lincoln
Spring / summer 2022 - date and location to be confirmed

Graduation Celebration, in-person (compulsory)

A special event to showcase the achievements of cohort 1 of the Faraday Institution Cluster PhD Programme. Hear stories of research impact, internship adventures, business spin outs and more.
Additional Training Opportunities
Open to all Faraday PhD Researchers

Wednesday 13th October 2021, 7:00 – 8:30pm

Royal Institution Public Outreach Lecture (optional)

From Galvani to Gigafactories, Professor Paul Shearing, UCL

Sign up via the Royal Institution website

The Faraday Institution continues its relationship with the Royal Institution, a specialist in the dissemination of scientific content via public engagement events to capture the imagination and curiosity of the general population.

Today, we take the easy availability of electric power for granted. From the phone in our pocket to the car charging in our garage, the modern world would be unthinkable without electricity and the batteries we rely on to deliver portable power. But the technology we rely on has its roots in the incredible work of scientists over the past 300 years. From the battery to the electric motor (which celebrates its 200-year anniversary in 2021), breakthroughs made in previous centuries continue to inform our technology today.

Join Paul Shearing as he tells the story of how the ability to store energy is continuing to shape the world we live in. A good opportunity for STEM Ambassadors to see science communication at its best.
Faraday Masterclasses, monthly, online

Hear from experts in the fields of battery technology and energy storage. Register.

Wednesday 6th October 2021: 'Career stories from the battery sector' with Professor Emma Kendrick

Future dates to be announced.

Recordings of past sessions are available on the Faraday Institution Slack Channel.

Tuesday 16th - Thursday 18th November 2021

Faraday Institution Annual Conference 2021, online (compulsory)

Joining a vibrant community of energy storage researchers and industry partners. This is an opportunity to hear from a range of expert presenters, interact with researchers at all levels and all projects, get the latest news about the research of the Faraday Institution and much more. The programme includes a day designed especially for early career researchers.

Register for the Faraday Institution Annual Conference!

17th - 18th November

Build collaborations in the UK battery research community

#Faraday2021
Friday 18th February 2022

Undergraduate Attraction Events on National Battery Day, in-person & online (compulsory)

Faraday Institution PhD researchers will run local attraction events for undergraduate students at their universities that showcase battery technology careers. This is an opportunity to get creative, inspire others, partner with university societies, career advisors, lectures and more.

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

Battery Day

6th Annual CDT Conference in Energy Storage from Thursday 5th to Saturday 7th April at the University of Sheffield (optional)

Hosted by the University of Sheffield

Join other early career researchers to explore the following:

- Conference themes
- Mechanical/kinetic storage
- Transportation
- Built environment
- Thermal/chemical/thermochemical storage
- Grid scale storage/power management and control
- Electrochemical storage
- Social, policy and economics
- Energy systems and advanced tools