Training Booklet

PROGRAMME OF TRAINING AT THE POSTGRADUATE INSTITUTE FOR MEASUREMENT SCIENCE

PostGraduate Institute
for measurement science

Contents

PGI Director's Foreword

The Postgraduate Institute for Measurement Science (PGI) is very pleased to be able to set out in this booklet an updated and expanded training offer that we hope will be of value and interest to you. The PGI is the strategic partnership between the National Physical Laboratory (NPL), the University of Strathclyde and the University of Surrey and has been established for 7 years. It has been instrumental in enabling us to develop and evolve postgraduate research and training in measurement science. With this training, we want to ensure that our excellent graduates, you, are ready for your future career whether that is within industry, academia, policy or other areas.

As you know, measurement underpins all science and engineering. Accordingly, a sound knowledge and understanding of this crucial discipline as well as how to manage uncertainty will assist you in getting the most out of your research. Additionally it will place you in a leading position to progress your career. At the PGI we believe that measurement science is also critical for problem-solving, driving innovation, decision making and for gaining a clear understanding of what your research can ultimately deliver.
We aim to provide, in parallel with our training offer, a nurturing environment that supports your development and enhances your doctoral research experience. The training we offer provides you with access to expertise that will give you a competitive advantage. It is worth noting that our training is delivered in an accessible way by world class scientists and academics and they will provide you with a unique set of skills that will give you distinctive career advancement opportunities.

I am therefore delighted that you will be part of the PGI training programme. I hope that these courses provide useful and meaningful learning outcomes to help you successfully embark on and navigate your career.

Richard Burguete
Postgraduate Institute Director

Overview of the PGI Training

The Postgraduate Institute for Measurement Science training is **free to all PGI students** (i.e. any postgraduate student working in collaboration with the National Physical Laboratory, and therefore assigned an NPL co-supervisor).

Suggested credit values for each of the NPL courses have been provided by our strategic partners, the University of Strathclyde and University of Surrey.

Our framework, outlined below, follows the approach of the Vitae Research Development Framework and comprises four main categories. We divide our **Training and Events calendar** year into quarters based on these categories and they are listed alongside:

- **Professional skills**
- **Communication skills**
- **Research skills**
- **Metrology skills***

The following pages have some examples of courses you can sign-up for under these headings – **we'll start with Metrology** since it is at **the heart of the training** provided by the PGI and a key component of the development of a PGI student.

vitae realising the potential of researchers

*(essential for all PGI students)

Metrology Skills

As the UK's National Measurement Institute, NPL develops and maintains the national primary measurement standards for all forms of measurement and NPL's training courses cover a range of subjects and measurement techniques suitable for PhD level.

Our Fundamentals of Metrology Programme provides students with advanced training in measurement, from its history and origins of measurement standards through to the redefinition of the new units of measure (SI units), now all based on fundamental constants. This programme is built from lectures developed, tested and validated for postgraduate courses with our academic partners, namely the Universities of Cambridge and Cranfield. Framed around the SI units, each programme component explains both the primary realisation of the unit at the practical measurement of the associated quantity. This training programme is a core part of the PGI training provision and is compulsory for all PGI students.

Examples of other courses on offer include:

Introduction to Measurement and Metrology

Introduction to the role of metrology and its worldwide relevance as well as the International System of Units (SI) and the base units.

Delivery: e-learning
Course Duration: 0.5 days
Credits: 2

Introduction to Measurement Uncertainty

This certified, self-paced, course explores the concepts of measurement uncertainty in a visual way without any equations. You will learn about sources of uncertainty, standard deviation, standard uncertainty, expanded uncertainty and more. A completion certificate is provided for this to count as part of your CPD.

Delivery: e-learning
Course Duration: 0.5 days
Credits: 2

Instrumentation and Sensors

Learning outcomes include developing an understanding of the principles of operation and characteristics of instrumentation and sensor systems; recognise and apply measurement best practice; identify ways to improve measurement results; troubleshoot and solve problems in instrumentation systems; and develop and encourage a questioning culture.

Delivery: Classroom or online
Course Duration: 2 days
Credits: 2

Introduction to Time and Frequency Measurement

This course provides an introduction to the measurement of time and frequency, time dissemination methods and time scales. This is the first of a series of courses created by NPL for the National Timing Centre (NTC) programme.

Delivery: e-learning
Course Duration: 1 day

Research Skills

Research training covers skills crucial for high-quality research. Training from associated partners is available for key scientific software and instruments you might need to utilise.

Data Integrity

The integrity of research data is critical to ensure that it is accurate, traceable, accessible and replicable. It is also important in preventing fraud and any type of manipulated results. This session emphasises the importance of data integrity, and provides tools and advice on how to process and manage data properly.
Delivery: Seminar
Course Duration: 2 hours

Software Training

As well as skills workshops, for students based in Teddington, NPL also offers a wide range of software training from Microsoft applications to LabVIEW. Tutorial videos regarding how to use Microsoft applications (Outlook, Word, Excel, Skype, OneNote, PowerPoint, Access, Publisher and OneDrive) can be found on the intranet.

The IT department also offers training courses throughout the year. However, these courses do have a fee. The following courses are available

- Excel Intermediate or Advance
- Outlook Advanced
- Excel for Scientists
- Word Intermediate or Advanced

Other courses are also available and are advertised on the intranet throughout the year. If you wish to find out what courses are next available then contact IT (itservicedesk@npl.co.uk).

The National Physical Laboratory also has an institute-wide MATLAB licence. All staff are eligible to install this software on their laptop or personal computer to use anytime, anywhere, including off-site. Thus, NPL-based students can take advantage of free MATLAB training.

- Learn MATLAB online with our interactive, self-paced courses
- Build your MATLAB skills
- Improve your research tools
- Learn with hands-on programming exercises.

Communication Skills

Communication training can involve anything from presentation skills to effective writing habits and workshops are available to demonstrate how to communicate your research effectively.

Presentation Skills

Presented by a skilled external trainer, this course will help you to present your research in an engaging and impactful way. Learn how to structure and deliver presentations effectively, and gain tools for speaking with confidence.
Delivery: Workshop
Course Duration: 0.5 day

Scientific Writing Skills

This workshop covers different aspects of writing scientific papers including, why writing technical papers is important to NPL and to the writer personally; the mechanics and structure of the writing process; the crucial importance of identifying the research question; hints on planning and authorship and formal aspects such as approval and submission, and responding to reviewers.
Delivery: Workshop
Course Duration: 0.5 day

Professional Skills

In the course of your PhD, you can acquire a range of transferable skills suitable for application outside of research. Learn how to make the most of these in this training category.

As well as many different networking modules and career development sessions, we offer courses such as:

Introduction to Intellectual Property

This workshop aims to provide a foundation to all aspects of intellectual property, which is fundamental to the successful realisation of impact. It covers all types of IP including patents, know-how, copyright, and provides guidelines on how to manage IP and publication, building a business case to move from an early stage concept to a licensable product, and commercial terms in research contracts that affect IP exploitation.

Delivery: e-learning

Course Duration: 1 day

Research Integrity and Reproducibility Webinar

Honesty and integrity in all stages of scientific practice, are of upmost importance. Having an understanding of ethics in science, is key for doctoral researchers.

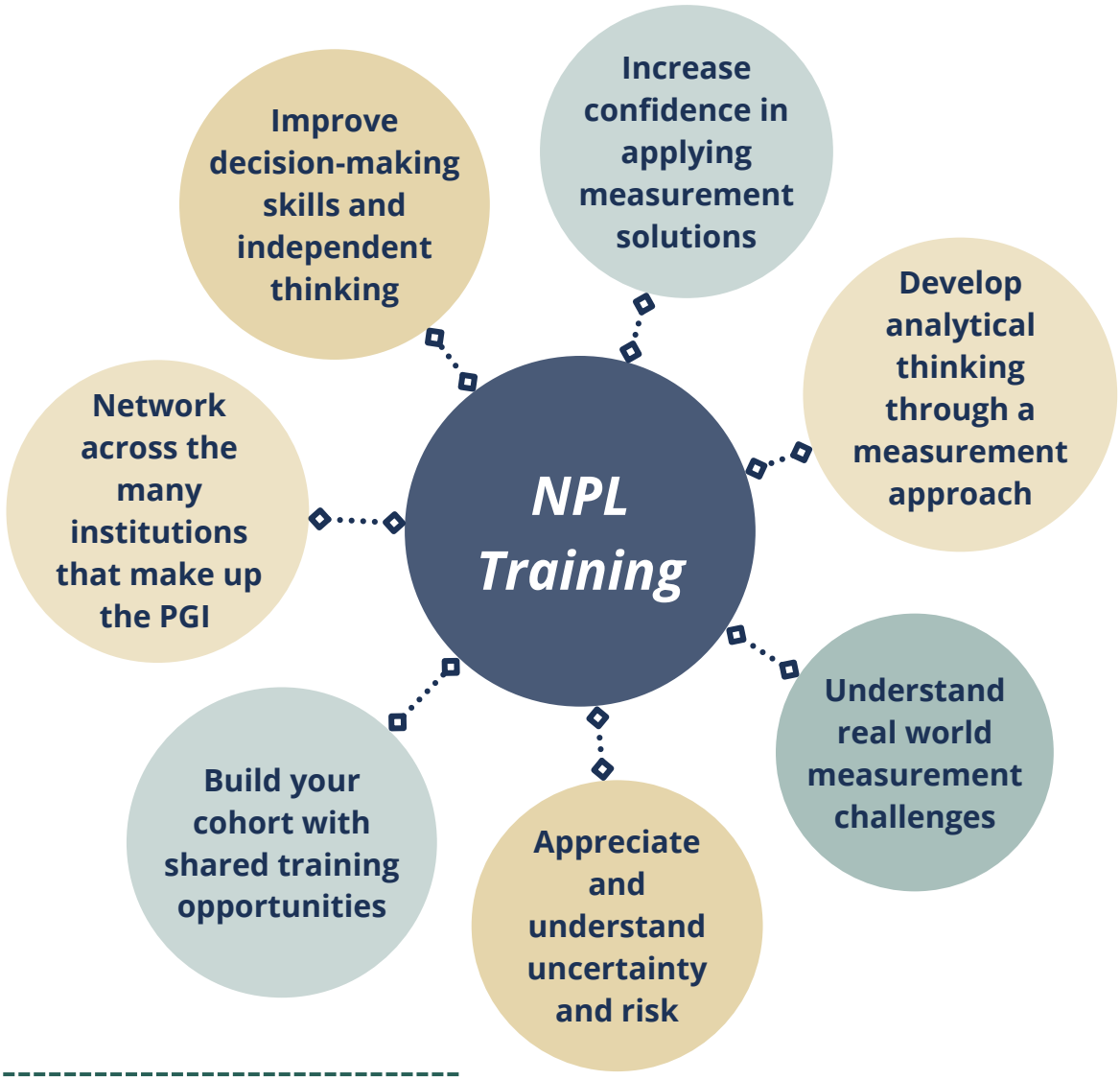
The system of ethics guides the practice of science, from data collection to publication and beyond. This talk will discuss a variety of ethical dilemmas that you may encounter during your PhD journey as well as suggest methods on how to deal with these challenging scenarios. Ian will also discuss the important work NPL is doing to ensure ethics, principles and sustainability are being upheld within the organisation.

Led by NPL's Head of Science, Prof Ian Gilmore.

Delivery: online

Course Duration: 1 hr

Benefits of training at NPL



> I now have a better understanding of managing and interpolating data which will help me apply better practices.

Data Integrity Training, Nov 2021

> "Great refresher on the process of journal article preparation, submission and review."

Scientific Writing Workshop, Nov 2021

> The measurement and uncertainty training sessions were useful in encouraging me to consider where sources of error may be in my own research and tackle those issues.

Uncertainty Workshop, Feb 2022

Our Networks

The PGI works closely with other academic networks to ensure strong links for PGI students between UK institutions and NPL.

The Scottish Universities Physics Alliance (SUPA) is a strategic alliance of eight Physics Schools with a shared strategy for research with funding from the Scottish Funding Council (SFC). Their members are the Universities of Aberdeen, Dundee, Edinburgh, Glasgow, Heriot-Watt, St Andrews, Strathclyde and West of Scotland. Find out more at supa.ac.uk.

The South East Physics Network (SEPnet) is a working collaboration consisting of Universities of Hertfordshire, Kent, Portsmouth, Southampton, Surrey, Sussex, as well as Queen Mary, University of London and Royal Holloway, University of London and the Open University. Find out more at sepnet.ac.uk.

Look out for the pivotal Gradnet Summer School which brings together industry and academic partners for a series of workshops, presentations and panels for early career researchers!

Postgraduate Institute Conference

The PGI organises an **annual conference** to **highlight the brilliant work of its students** and other early career scientists and engineers. The conference is a unique collaboration between industry, NPL and academia, and provides a platform for PGRs to **showcase their research**. PGI students often view the conference as a training opportunity, choosing to use the occasion to demonstrate their presentation and communication skills by presenting their research to their peer group, as well as to invited industry partners, academics and policymakers.

As the conference is organised by a small group of PGI student volunteers, the event itself offers training opportunities. Each year, students can volunteer to join the conference committee, gain valuable event management experience and help bring the event to life.

Together the committee, supported by the PGI team, invite experts and practitioners in the field measurement science to create an exciting two-day programme for the PGI community. **Free to all PGI students**, the conference also offers students the opportunity to discuss their **career options** and **network** with other students and industry guests.

Find out more by visiting https://www.npl.co.uk/skills-learning/pgi/pgi-conference.

Or if you would like to volunteer to help at next year's event please email pgi@npl.co.uk.

How to access training

1. **Review which courses you would like to take and over what time period** – confirm suitability of courses with your supervisor(s)

2. **Send an email to pgi@npl.co.uk** requesting registration on your selected course(s). Or book online via Eventbrite (if stated in marketing)

3. **Content of registration will be sent by return email** and will include:
   - Registration details for the course
   - Instructions on how to access e-learning content; and/or
   - Details of when and where classroom-based courses will be delivered

4. **Work through online course or attend classroom-based course**

5. **Record of attendance and assessment results will be sent** if appropriate.

6. Remember to **look out for the PGI Bulletin** in your emails or **check the PGI Information Portal (PIP)** for further training opportunities.

PostGraduate Institute
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Department for Business, Energy & Industrial Strategy

Find out more:

PGI Information Portal - Known as the 'PIP', this portal contains all information for PGI students, including upcoming training and events. Please note that you must be registered with the PGI to access this. **Access here to PIP**.

PGI Bulletin - Reminders of the monthly activities and training can be found in the PGI Bulletin email. Please note that you must be registered with the PGI to receive these emails.

PGI Website - Monthly training and event lists can be found on the PGI training website. The training page contains pdf documents summarising the key training events for the upcoming months. **Access to the PGI website here**.

Email PGI - If you are unsure of the next training or event, or want more information about a training course or event, please contact **pgi@npl.co.uk** directly.

The Postgraduate Institute for Measurement Science has been established following a strategic partnership between the Department for Business, Energy & Industrial Strategy (BEIS), the Universities of Strathclyde and Surrey and the National Physical Laboratory.

Further key contacts:

Switchboard: 020 8977 3222 | pgiambassadors@npl.co.uk | IT Training: itservicedesk@npl.co.uk

Get in touch

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