



University of
Nottingham

Nanoscale and Microscale Research Centre

A close-up photograph of a scientist wearing safety glasses and blue gloves, working with a complex microfluidic or nanofabrication device. The device has various components, including a green chip and a small glass vial. The background is blurred, showing a laboratory setting.

Nanoscale and Microscale Research Centre (nmRC)

Seminar Series - Autumn 2022



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nmRC Seminar Series

Autumn 2022

RESEARCHER ACADEMY SEMINARS

This Autumn the nmRC is delighted to offer four seminars in conjunction with the **Researcher Academy**:

Seminar Title	Live Session Delivery Date
Electron Microscopy: Introduction to Scanning Electron Microscopy (SEM) and SEM Sample Preparation https://training.nottingham.ac.uk/Course?courserref=RASEMW&dates=0	02/11/2022
Electron Microscopy: Introduction to Transmission Electron Microscopy (TEM) and TEM Sample Preparation https://training.nottingham.ac.uk/Course?courserref=RATEMW&dates=0	09/11/2022
Raman Spectroscopy: Introduction https://training.nottingham.ac.uk/Course?courserref=RARSW&dates=0	16/11/2022
Surface Analysis with Time-of-Flight Secondary Ion Mass Spectrometry (ToF-SIMS) https://training.nottingham.ac.uk/Course?courserref=RASIMW&dates=0	25/11/2022

These seminars are bookable on the University of Nottingham's Short Course Catalogue (SCS) via the links given above.

More detailed descriptions of these seminars are provided below in the seminar information section.

Please note:

- Delivery of the live sessions will take place in person
- Seminar content and resources will be made available via moodle to those registered for each seminar.
- Each seminar has an 'asynchronous' component where attendees are expected to watch pre-recorded videos from the course tutors in advance of the live session delivery date. Time commitments for this vary per course but are detailed in the seminar description section.



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SPECIALIST SEMINARS

In addition to the Researcher Academy seminars, the nmRC will also be running several in-house seminars for analytical and fabrication specialisms:

Seminar Title	Live Session Delivery Date
Electron Microscopy: Spectroscopy	01/11/2022
Electron Beam Lithography (EBL)	03/11/2022
Focussed Ion Beam Scanning Electron Microscopy (FIB-SEM)	07/11/2022
Electron Microscopy: Biological Sample Preparation and Cryogenic-EM	10/11/2022
Electron Microscopy: Image Processing & Simulation	15/11/2022
Electron Microscopy: In-Situ Techniques	17/11/2022
Raman Spectroscopy: Advanced	22/11/2022
Atomic Force Microscopy (AFM)	24/11/2022
Ellipsometry	01/12/2022
Electron Microscopy: Wavelength Dispersive X-Ray Spectroscopy (WDS) & Mineral Liberation Analysis (MLA)	06/12/2022
Presenting nmRC Images and Plots	08/12/2022
Introduction to SEM and TEM In-situ Mechanical Testing	09/12/2022
Environmental Scanning Electron Microscopy (ESEM)	13/12/2022
Correlating Super-Resolution Confocal Microscopy with Scanning Electron Microscopy	15/12/2022

More detailed descriptions of these seminars are provided below in the seminar information section. These seminars are bookable via filling in this form: <https://forms.office.com/r/FYzzRKmmSn>

Once your booking is confirmed you will receive a calendar invite for the seminar.

Please note:

- These seminars are not part of the CSC so do not afford training points for completion.
- Delivery of the live sessions will take place in A05, Cripps South Building, University Park.
- Places for these seminars are limited to 25. If oversubscribed you will be put on a waiting list and will receive an email should a spot become open.



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SEMINAR INFORMATION - RESEARCHER ACADEMY SEMINARS

1: Electron Microscopy: Introduction to Scanning Electron Microscopy (SEM) and SEM Sample Preparation

When: Wednesday 2nd November 2022 1pm-3pm
Where: C01, ESLC, University Park
Duration: 4 hours (2 Hours Self-Study, 2 Hours In-Person Seminar)
Course Tutor: Prof. Paul D Brown

This course is designed for electron microscopy users at the nmRC and is suited ideally for novice users or those wanting refresher training. This course will cover:

- ⇒ Introduction to the nmRC.
- ⇒ Introduction to scanning electron microscopy (SEM).
- ⇒ Overview of SEM instrumentation.
- ⇒ Introduction to sample preparation for SEM.
- ⇒ Strategies for handling bulk, thick/thin film (plan-view/cross-section) and particulate materials.
- ⇒ Strategies for handling hard, soft and temperature sensitive materials.
- ⇒ Cleaning protocols/plasma cleaning.

2: Electron Microscopy: Introduction to Transmission Electron Microscopy (TEM) and TEM Sample Preparation

When: Wednesday 9th November 2022 3pm-5pm
Where: A09, ESLC, University Park
Duration: 4 hours (2 Hours Self-Study, 2 Hours In-Person Seminar)
Course Tutor: Prof. Paul Brown

This course is designed for electron microscopy users at the nmRC and is suited ideally for novice users or those wanting refresher training. This course will cover:

- ⇒ Introduction to the nmRC.
- ⇒ Introduction to transmission electron microscopy (TEM).
- ⇒ Overview of TEM instrumentation.
- ⇒ Introduction to sample preparation for TEM.
- ⇒ Strategies for handling bulk, thick/thin film (plan-view/cross-section) and particulate materials.
- ⇒ Strategies for handling hard, soft and temperature sensitive materials.
- ⇒ Cleaning protocols/plasma cleaning.



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SEMINAR INFORMATION - RESEARCHER ACADEMY SEMINARS

3: Raman Spectroscopy: [An Introduction](#)

When: Wednesday 16th November 2022 1pm-2pm
Where: C01, ESLC, University Park
Duration: 4 hours (2 hours 45 minutes Pre-Recorded Content, 1 Hour In-Person session)
Course Tutor: Dr. Graham Rance

This course provides an overview of the principles of Raman spectroscopy and imaging, their application in nanoscale and microscale materials characterisation. Ideal for students/staff considering using the technique or as a complement to the practical training received by users of the Raman spectroscopy laboratories (B14 and B15) at the Nanoscale and Microscale Research Centre (nmRC). On completion attendees will be able to:

- ⇒ Describe the main differences between infrared and Raman spectroscopies.
- ⇒ Define the Raman effect and describe how it can be used to study vibrational states.
- ⇒ Describe the information that can be obtained from a Raman spectrum.
- ⇒ Describe the information that can be obtained from a Raman image.
- ⇒ Define the main components of the confocal Raman microscope.
- ⇒ Define spectral and spatial resolution and describe how they can be controlled.

4: ToF SIMS: [Surface Analysis with Time of flight Secondary Ion Mass Spectrometry \(ToF SIMS\) and 3D OrbiSIMS](#)

When: Friday 25th November 2022 1pm-2pm
Where: C01, ESLC, University Park
Duration: 3 Hours (2 Hours Pre-Recorded Content, 1 Hour In-Person session)
Course Tutor: Dr. Anna Kotowska, Dr. Nichola Starr, Dr. David Scurr

This course provides an introduction to the surface chemical analysis techniques Time of flight Secondary Mass Spectrometry (ToF SIMS) and 3D OrbiSIMS. It is intended for novice users of this instrumentation or those with an interest in the technique. The seminar will cover:

- ⇒ Introduction to ToF SIMS and 3D OrbiSIMS theory and instrumentation (basics & capabilities).
- ⇒ Familiarisation with SIMS facilities available at the nmRC and elsewhere.
- ⇒ Theoretical basis for techniques based on ToF-SIMS.
- ⇒ Functionality of specific instrumentation.
- ⇒ Practical applications of ToF-SIMS techniques.



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SEMINAR INFORMATION - nmRC SPECIALIST SEMINARS

1: Electron Microscopy: **Spectroscopy**

When: Tuesday 1st November 2022, 1pm-2pm
Where: A05, Cripps South Building, University Park
Course Tutor: Dr Mike W Fay

This course is designed for electron microscopy users at the nmRC and is suited ideally for novice users or those wanting refresher training. This course will cover:

- ⇒ Introduction to the principles and applications of spectroscopy within the field of electron microscopy
- ⇒ An overview of the spectroscopy techniques of Energy Dispersive X-Ray Spectroscopy (EDS) and Wavelength Dispersive X-Ray Spectroscopy (WDS) in SEM.
- ⇒ An overview of the spectroscopy techniques of EDS and Electron Energy Loss Spectroscopy (EELS) in TEM.

Max. places = 25

2: Electron Beam lithography (EBL)

When: Thursday 3rd November 2022, 1pm-2pm
Where: A05, Cripps South Building, University Park
Course Tutor: Dr. Richard Cousins

This course is designed as an introduction as to what is possible with EBL and is aimed at novice and potential users of EBL. It will cover:

- ⇒ Basic principles of EBL, and how exposures are performed.
- ⇒ What is possible to do with EBL, and how to prepare samples and designs.
- ⇒ How to combine EBL with a range of other nanofabrication techniques to create a wide range of structures.
- ⇒ How to use EBL and maskless lithography to create Microfluidic devices.

Max. places = 25

3: Electron Microscopy: **Focused Ion Beam Scanning Electron Microscopy (FIB-SEM)**

When: Monday 7th November 2022, 1pm-2pm
Where: A05, Cripps South Building, University Park
Course Tutor: Dr. Chris Parmenter

This course provides an introduction to Focused Ion Beam Scanning Electron Microscopy (FIBSEM) is intended for novice users of this instrumentation. The course will cover:

- ⇒ Introduction to FIBSEM and associated instrumentation (basics & capabilities) .
- ⇒ Specialist sample preparation and handling.
- ⇒ Application examples.
- ⇒

Max. places = 25



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4: Electron Microscopy: **Biological Sample Preparation & Cryogenic-Electron Microscopy**

When: Thursday 10th November 2022, 1pm-2pm
Where: A05, Cripps South Building, University Park
Course Tutor: Dr. Julie Watts

This course provides an introduction to Electron Microscopy under cryogenic conditions (cryo-EM) and is designed for people wishing to image tissues, cells or hydrated materials and includes:

- ⇒ Introduction to Cryo-EM instrumentation (basics & capabilities) and sample handling
- ⇒ An overview of staining, fixation and embedding techniques
- ⇒ An overview of drying, freezing and environmental SEM
- ⇒ An overview of trimming, sectioning and focussed ion beam milling
- ⇒ An introduction to 3D strategies
- ⇒ Correlation between techniques

Max. places = 25

5: Electron Microscopy: **Image Processing & Simulation**

When: Tuesday 15th November 2022, 1pm-2pm
Where: A05, Cripps South Building, University Park
Course Tutor: Dr. Mike W Fay

This course is designed for electron microscopy users at the nmRC and is suited ideally for novice users or those wanting refresher training. This course will cover:

- ⇒ Introduction to digital images and image processing
- ⇒ Introduction to image simulation

Max. places = 25

6: Electron Microscopy: ***In Situ* Techniques**

When: Thursday 17th November 2022, 1pm-2pm
Where: A05, Cripps South Building, University Park
Course Tutor: Prof. Paul D Brown

This course is designed for electron microscopy users at the nmRC and is suited ideally for novice users wanting refresher training or introduction to a variety of complementary EM techniques. This course will cover:

- ⇒ Introduction to *in situ* techniques for SEM - including EBSD, hot-stage, strain-stage, EBIC, CL
- ⇒ Introduction to *in situ* techniques for TEM - including hot-stage, cold-stage, tomography, gas-cell, STEBIC, Lorentz

Max. places = 25



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7: Raman Spectroscopy: **Advanced**

When: Tuesday 22nd November 2022, 1pm-2pm
Where: A05, Cripps South Building, University Park
Course Tutor: Dr. Graham Rance

This course provides an advanced overview of the instrumentation used for Raman spectroscopy and imaging, how it can be optimised for nanoscale and microscale materials characterisation and is intended to complement the practical training received by users of the Raman spectroscopy laboratories (B14 and B15) at the Nanoscale and Microscale Research Centre (nmRC). This training is designed for those with an understanding of the principles of Raman spectroscopy and current users of instrumentation.

Max. places = 25

8: Atomic Force Microscopy (AFM)

When: Thursday 24th November 2022, 1pm-2pm
Where: A05, Cripps South Building, University Park
Course Tutor: Dr Long Jiang

This course is designed for AFM users at the University of Nottingham and is suited ideally for novice users or those wanting refresher training. This course will cover:

- ⇒ Background to AFM
- ⇒ How AFM works
- ⇒ What information can AFM provide
- ⇒ Where to access AFM at UoN

Max. places = 25

9: Ellipsometry

When: Thursday 1st December 2022, 1pm-2pm
Where: A05, Cripps South Building, University Park
Course Tutor: Dr Richard Cousins

This course is designed to give an introduction to ellipsometry as a tool to measure thin films. This course will cover:

- ⇒ Basic explanation of the physics behind ellipsometry
- ⇒ What can be measured via ellipsometry.
- ⇒ What can be measured via the nmRC's ep4 imaging ellipsometer
- ⇒ How to use the ep4 imaging ellipsometer

Max. places = 25



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10: Electron Microscopy: **Wavelength Dispersive X-ray Spectroscopy (WDS) & Mineral Liberation Analysis (MLA)**

When: Tuesday 6th December 2022, 1pm-2pm
Where: A05, Cripps South Building, University Park
Course Tutor: Ms Lorelei Robertson

This course provides an introduction to wave dispersive spectrometers (WDS) and their uses in SEM and in electron microprobes (EPMA). An introduction to electron microprobes will also be covered. The course will also introduce the technique of mineral liberation analysis SEM (MLA-SEM) for phase analysis.

- ⇒ Introduction to EPMA theory and instrumentation (basics & capabilities)
- ⇒ Introduction to MLA-SEM theory and instrumentation (basics & capabilities)

Max. places = 25

11: Presenting nmRC Images and Plots

When: Thursday 8th December 2022, 1pm-2pm
Where: A05, Cripps South Building, University Park
Course Tutor: Dr Michael Fay

This course is designed for users of the nmRC and is suited for those needing an introduction and overview to techniques used to communicate data or information clearly by figures and graphs.

- ⇒ Principles of micrograph image adjustment for presentation
- ⇒ Overview of presentation of plots
- ⇒ How to consider the audience in presenting your data

Max. places = 25

12: Electron Microscopy: **Introduction to SEM and TEM In-situ Mechanical Testing**

When: Friday 9th December 2022, 1pm-2pm
Where: A05, Cripps South Building, University Park
Course Tutor: Dr Oriol Gavalda Diaz

This course is designed for electron microscopy users at the nmRC and is suited ideally for novice users or those wanting refresher training or introduction to a variety of complementary EM techniques. This course will include recent technique development in the field of micro and nanomechanical testing.

Max. places = 25



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13: Environmental Scanning Electron Microscopy (ESEM)

When: Tuesday 13th December 2022, 1pm-2pm
Where: A05, Cripps South Building, University Park
Course Tutor: Ms. Nikki Weston

This course provides an introduction to Environmental Scanning Electron Microscopy (ESEM) and is intended for novice users of this instrumentation. The course will cover:

- ⇒ Introduction to ESEM instrumentation (basics & capabilities).
- ⇒ Specialist sample preparation and handling

Max. places = 25

14: Correlating Super-resolution Confocal Microscopy with Scanning Electron Microscopy

When: Thursday 15th December 2022, 1pm-2pm
Where: A05, Cripps South Building, University Park
Course Tutor: Dr Jacqueline Hicks

This course is designed for users of the nmRC who want to get the most from their confocal images and give an introduction to correlative light and electron imaging. The course will cover:

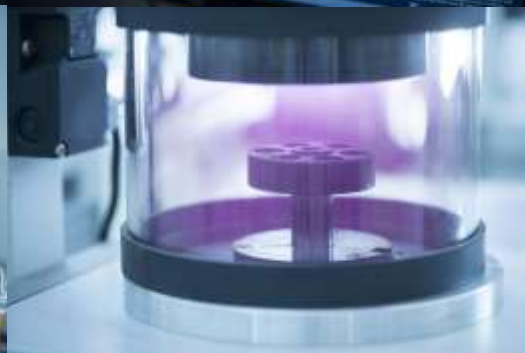
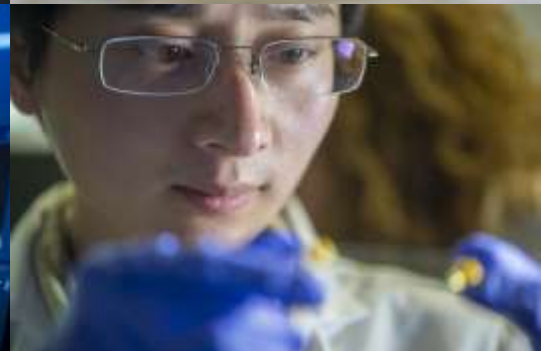
- ⇒ An overview of the basics of confocal imaging and how to design your experiment
- ⇒ An introduction to the airyscan detector for super-resolution imaging
- ⇒ How to move your work to correlative imaging to get the most of both techniques

Max. places = 25



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Contact Us:

Nanoscale and Microscale Research Centre
Cripps South Building (Building 53),
University Park,
Nottingham,
NG7 2RD

Email: [nmrcenquiries@nottingham.ac.uk](mailto:nmrcentquiries@nottingham.ac.uk)
Tel: 0115 74 86340

