



University of
Nottingham

Nanoscale and Microscale Research Centre

Nanoscale and Microscale Research Centre (nmRC)

Seminar Series - Spring 2024





nmRC Seminar Series

Spring 2024

The nmRC will be running several in-house seminars for analytical and fabrication specialisms. All seminars are 1-2pm unless otherwise stated.

Seminar Title	Live Session Delivery Date
Electron Microscopy: Spectroscopy	30/04/2024
Electron Microscopy: Intro to Scanning Electron Microscopy (SEM) and SEM Sample Prep	01/05/2024 9.30am-11am
Electron Microscopy: Intro to Transmission Electron Microscopy (TEM) and TEM Sample Prep	01/05/2024 11am-12.30pm
Electron Beam Lithography (EBL)	02/05/2024
Focussed Ion Beam Scanning Electron Microscopy (FIB-SEM)	07/05/2024
Electron Microscopy: Biological Sample Preparation and Cryogenic-EM	08/05/2024
Electron Microscopy: Image Processing & Simulation	09/05/2024
Surface Analysis with Time-of-Flight Secondary Ion Mass Spectrometry and 3DOrbiSIMS	10/05/2024 10am-11am
Atomic Force Microscopy (AFM)	13/05/2024 *RESCHEDULED
Science Presentation Skills	14/05/2024
Raman Spectroscopy: Introduction *	15/05/2024
Electron Microscopy: In-Situ Techniques	16/05/2024 10am-11am
Ellipsometry	22/05/2024
Electron Microscopy: Wavelength Dispersive X-Ray Spectroscopy (WDS) & Mineral Liberation Analysis (MLA)	23/05/2024
Presenting nmRC Images and Plots	28/05/2024
Environmental Scanning Electron Microscopy (ESEM)	29/05/2024 12pm-1pm
Raman Spectroscopy: Advanced *	30/05/2024
Correlating Super-Resolution Confocal Microscopy with Scanning Electron Microscopy	04/06/2024

More detailed descriptions of these seminars are provided below . These seminars are bookable via filling in this form: <https://forms.office.com/e/C6xmnAatKP>



nmRC Seminar Series

Spring 2024

Once you have submitted the online form, your booking is confirmed unless you receive an email to say you are on the waiting list.

Please note:

- 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.
- Seminars marked * require attendees to watch video recordings on Moodle in advance of attending the seminar. All other seminars will have video recordings made available afterwards to those who attended the seminar.

1: Electron Microscopy: Spectroscopy

When: Tuesday 30th April 2024, 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.

2: Electron Microscopy: Introduction to Scanning Electron Microscopy (SEM) and SEM Sample Prep

When: Wednesday 1st May 2024, 9.30am-11am
Where: A05, Cripps South Building, University Park
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 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.



nmRC Seminar Series

Spring 2024

3: Electron Microscopy: Introduction to Transmission Electron Microscopy (TEM) and TEM Sample Prep

When: Wednesday 1st May 2024, 11am-12.30pm
Where: A05, Cripps South Building, University Park
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.

4: Electron Beam lithography (EBL)

When: Thursday 2nd May 2024, 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.

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

When: Tuesday 7th May 2024, 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.



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

When: Wednesday 8th May 2024, 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

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

When: Thursday 9th May 2023, 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

8: Surface Analysis with Time-of-Flight Secondary Ion Mass Spectrometry and 3D OrbiSIMS

When: Friday 10th May 2024, 10am-11am
Where: A05, Cripps South Building, University Park
Course Tutor: Dr Anna Kotowska and Dr Nichola Starr

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.



nmRC Seminar Series

Spring 2024

9: Atomic Force Microscopy (AFM)

When: Monday 13th May 2024, 1pm-2pm
Where: A05, Cripps South Building, University Park
Course Tutor: Dr Long Jiang and Dr James Kerfoot

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

10: Science Presentation Skills

When: Tuesday 14th May 2024, 1pm-2pm
Where: A05, Cripps South Building, University Park
Course Tutor: Dr. Luke Norman

This course is designed for scientists at all levels who want to develop the way they present their research. This course will cover:

- ⇒ Tips and tricks for creating engaging presentations and producing smart plots and figures
- ⇒ How to adapt a presentation to be aimed at various types of audiences
- ⇒ Examples of how to break up complexity within a PowerPoint slide

11: Raman Spectroscopy: Introduction *

When: Wednesday 15th May 2024, 1pm-2pm
Where: A05, Cripps South Building, University Park
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.



12: Electron Microscopy: *In Situ* Techniques

When: Thursday 16th May 2024, 10am-11am
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

13: Ellipsometry

When: Wednesday 22nd May 2024, 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

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

When: Thursday 23rd May 2024, 1pm-2pm
Where: A05, Cripps South Building, University Park
Course Tutor: 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)



15: Presenting nmRC Images and Plots

When: Tuesday 28th May 2024, 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

16: Electron Microscopy: Environmental Scanning Electron Microscopy (ESEM)

When: Wednesday 29th May 2023, 12pm-1pm
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

17: Raman Spectroscopy: **Advanced ***

When: Thursday 30th May 2024, 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.



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

When: Tuesday 4th June 2024, 1pm-2pm
Where: A05, Cripps South Building, University Park
Course Tutor: Dr Jacqueline Hicks

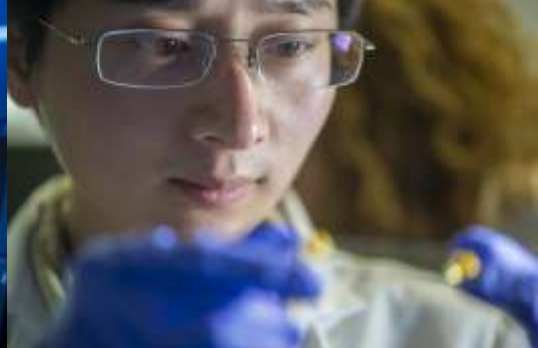
This course is designed for users of the nmRC who want to get the most from their confocal images and give an introduction to correlative light and electron imaging. The course will cover:

- ⇒ 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



University of
Nottingham

Nanoscale and Microscale Research Centre



Contact Us:

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

Email: nmrcenquiries@nottingham.ac.uk
Tel: 0115 74 86340

