

Connect. Exchange. Innovate.

# IDEA League PHD Course

## Advanced Atomic Scale Characterisation

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IDEA League | PHD Course  
Advanced Atomic Scale  
Characterisation

Chalmers University of Technology  
Department of Physics  
May 12-16, 2025

 **IDEA** League

**RWTH**AACHEN  
UNIVERSITY

 **POLITECNICO**  
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UNIVERSITY OF TECHNOLOGY

## Aims and scope of the PhD Course

Knowledge of the atomic-scale structure, processes, and properties of advanced materials is a prerequisite for improving their properties and behavior in technological applications across a broad range of disciplines. Atomic-scale characterization makes it possible to shorten development cycles, improve lifetimes, and enable new technological innovations. Furthermore, knowledge of structural behavior and atomic-scale mechanisms provides important input for modeling and simulation.

The aim of the course is to encourage and strengthen a sustainable network of young and talented researchers between the IDEA League universities and to equip that network with improved competencies in Atomic Scale Characterisation

## Purpose

The course at Chalmers University of Technology will focus on advanced techniques for high-resolution electron microscopy, specifically for scientists currently using transmission electron microscopes in materials science studies. Laboratory sessions will showcase state-of-the-art instrumentation.

Participants should have a basic understanding of conventional electron microscope operation.

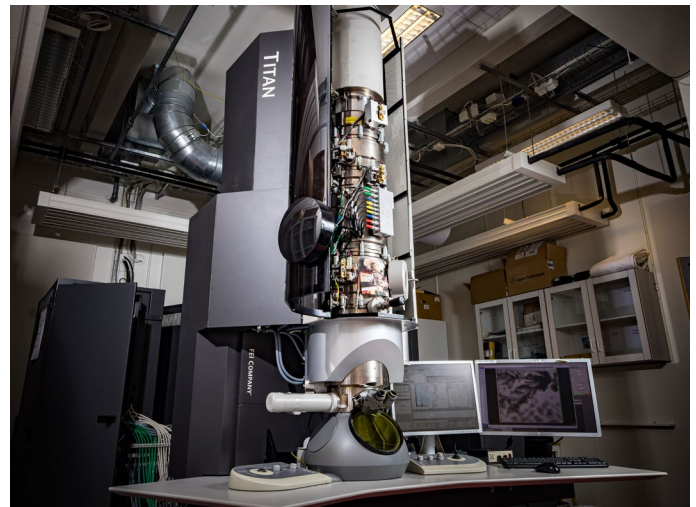
## Participants

The course will be open to PhD candidates and postdoctoral researchers from the participating universities. The school specifically addresses young researchers in the following disciplines:

Chemistry, Physics, Materials Science and Engineering, and Electrical Engineering

Examples of application fields include:

Nanoscience and nanomaterials, solid state physics/chemistry, catalysis, functional materials, materials for IT, quantum materials and 2-D materials. No prior knowledge in the specific experimental techniques is needed but a basic understanding of conventional electron microscope operation is required.



## Lectures

The course will feature lectures on High precision STEM

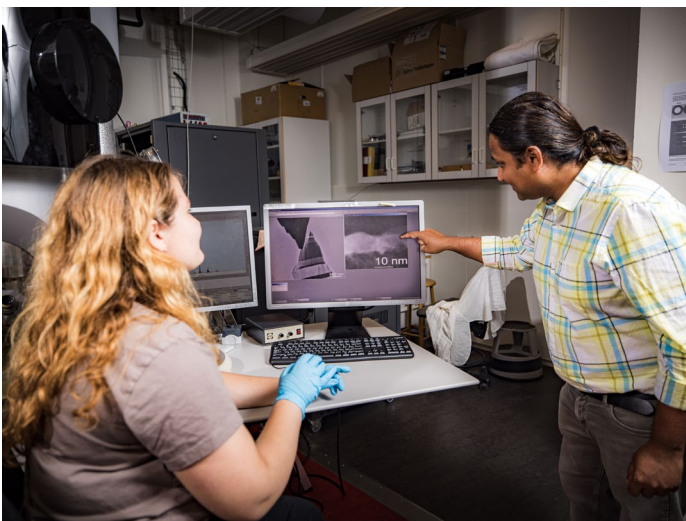
- TEM Tomography
- Image Processing
- In situ
- EDX
- EELS
- Monochromated EELS
- Differential Phase Contrast
- Electron Beam Dose Considerations
- Applications of Advanced TEM

## Laboratory sessions

The course will include laboratory sessions on:

- TEM tomography
- High precision STEM
- Monochromated EELS and Atomic Resolution EDX (JEOL 200F NEOMono)
- Specimen Preparation

The laboratory sessions will be carried out using monochromated and double-corrected JEOL-ARM200F NEOARM, the monochromated and probe-corrected Titan 80-300, the Tecnai G2 TEM and the FEI Versa 3D.



### Application

Application is open to PhD candidates and postdoctoral researchers of the member universities from the IDEA League Alliance.

Applications must be accompanied by a CV, motivation letter including a description of acquired experience of TEM, and a letter from the supervisor. Participation will be selected based on personal achievements.

### Costs

There are no participation or accommodation fees. Students from IDEA League member universities selected to participate in a PhD Course only have to pay for their own travel (and visa) costs.

	Monday	Tuesday	Wednesday	Thursday	Friday
09:00 - 10:30		Lecture 3	Lecture 5	Lecture 7	Lecture 9
10:30 - 10:45		Coffee/Tea	Coffee/Tea	Coffee/Tea	Coffee/Tea
10:45 - 11:30		Lecture 4	Lecture 6	Lecture 8	Clea Room Tour
11:30 - 12:15	Arrival	Lecture 4	Lecture 6	Lecture 8	Conclusion
12:15 - 13:15	Sandwich	Lunch		Lunch	Lunch
13:15 - 15:00	Lecture 1	Lab Session	Lab Session	Lab Session	
15:00 - 15:30	Coffee/Tea	Coffee/Tea	Coffee/Tea	Lab Session	
15:30 - 17:15	Lecture 2	Lab Session	Lab Session	Lab Session	
17:30 - 20:00	Pizza Gathering	Free Time	Free Time	Free Time	
18:30 - 21:30		Dinner Chalmersska Huset			

