

**SHORT TERM QIP COURSE**  
**ON**  
**TEM and HRTEM**  
**in**  
**Materials Characterisation**  
  
**(TEM/HRTEM-2017)**

**September 18<sup>th</sup> -22<sup>nd</sup>, 2017**

**Venue:**

**PBCEC, Visitors Hostel**  
**Indian Institute of Technology Kanpur**



**Department of Materials Science & Engg.**  
**Indian Institute of Technology Kanpur**  
**Kanpur, 208 016**

**ABOUT THE COURSE**

TEM/HRTEM has become the most essential characterization tool in advanced materials processing/development/design. The range of experimental techniques available requires varying degree of expertise, both in the conduct of the analysis on the microscope and interpretation of the acquired data/results. Some of the techniques are highly demanding and sophisticated enough to make their usage impossible without rigorous training and experience. The lack of exposure and expertise in these techniques is becoming more and more a limitation in carrying out the highest possible quality of research using these advanced research tools. This course aims to address this shortcoming.

**CHARACTERISATION TOOLS/TECHNIQUE**

The course will cover characterization tools and Techniques viz. TEM, STEM/HAADF, HRTEM and nano-analysis in TEM. Major topics to be covered are:

**Introduction to Electron Microscopy and Allied Techniques**

**Transmission Electron Microscopy (TEM)**

- Instrument and its attachment
- Physical basis for Electron microscopy, Contrast mechanism/ Interpretations
- Imaging modes: BF, DF and WB-DF, Defect analysis in TEM
- Electron diffraction: SAED, CBED, etc.
- Fine structure in SADP and interpretations
- Specimen preparation for TEM

**Scanning Transmission Electron Microscopy**

- Physics behind STEM/HAADF
- Z-contrast imaging, Atomic scale imaging by STEM
- Nano-Chemical analysis: EDS and EELS
- 3D Tomography of materials

**High Resolution Transmission Electron Microscopy**

- Basis of Phase contrast imaging
- In-situ studies in TEM/HRTEM
- Image processing and simulations

**Comparison with other Atomic scale imaging AFM/STM/APT etc.**

The course will cover the fundamentals as well as applications of complete range of Microscopy and microanalysis techniques.

### SCOPE AND OBJECTIVE OF THE COURSE

The course will start with introduction to various techniques and their fundamentals. It will also give case studies of most challenging and precise analysis possible using these equipments. Both the theoretical aspects and practical applications will be discussed. The course is designed to cater both the aspiring electron microscopists and advanced researchers looking for an insight into the atomic/nano-/micro-scale details of materials. The objectives of the course are:

- Provide fundamentals of electron nanoscopy
- Provide practical training for proper conduct of data acquisition, analysis and interpretation
- To give exposure to range of applications of TEM/STEM/HRTEM
- To provide training for preparing and handling sample for each of these techniques

### APPLICATION/REGISTRATION PROCEDURE

1. Fill in google form and obtain approval to participate. ([https://docs.google.com/forms/d/e/1FAIpQLSergHkx\\_5E6cbeJS\\_ZxYaBQhHuaDWJVAZpDJ2-qc6dIbzLulw/viewform?c=0&w=1](https://docs.google.com/forms/d/e/1FAIpQLSergHkx_5E6cbeJS_ZxYaBQhHuaDWJVAZpDJ2-qc6dIbzLulw/viewform?c=0&w=1))
2. After approval fill in registration form and get signatures.
3. Send completed form along with the registration fee.
4. Last date submission of registration Fee & form: 20/08/2017.

### REGISTRATION FEES

A maximum of 40 participants will be selected (first-come-first serve basis) and the participants need to send a letter from their Head of the Institute/Department, in support of their application. Ph.D Students should route their application through supervisor/HOD.

1. Faculty from AICTE Institutes coming under QIP program (refundable only on participation): Rs.1000/-
2. Faculty from private/autonomous Institutions: Rs. 10,000/-
3. Ph.D Students of IITK Rs. 3,000/-
4. Ph.D Students from Educational Institutions: Rs. 6,000/-
5. Participant from Industry and R&D labs: Rs. 15,000/-

Cancellation charges before 15/9/17 all categories: Rs. 1000/-

**After 15/9/17 no refund of registration Fee**

*Payment only by demand draft in favour of  
"Coordinator, CEP, IIT Kanpur"*

### ABOUT ACCOMMODATION

Accommodation in IITK guest house will be arranged only for participant from outside Kanpur city on advance request at the time of application itself. All participants have to pay the accommodation charges by themselves. QIP candidates will be provided a subsidy of Rs.1000/- towards accommodation for the course period. The guest room occupants should agree to abide by the existing rules and regulations of guest house. Participants will be asked to share accommodation in case single occupancy is unavailable.

Rental details:

**Visitors hostel (AC room): For participants other than students.**

Single occupancy – Rs. 750/-      Double occupancy – Rs. 1100/-

**Visitors Hostel Extension (Non-AC): For all student participants**

Single occupancy – Rs. 300/-      Double occupancy – Rs. 400/-

### ARRANGEMENT FOR FOOD

Food is being arranged in VH dining hall for all the registered participants. Breakfast, lunch, dinner will be provided. Tea/coffee and snacks will be provided at the venue during breaks. VH is located 1 km from VH extension. Venue for lecture session is located within VH premises.

### **For further information and queries contact:**

*Coordinator*

Dr. Gouthama

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*Co-coordinator::*

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### **Address for mailing Registration Form and Fee:**

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