



Kharagpur - a dusty town tucked away in the eastern corner of India, famous until 1950 as home to the longest railway platform in the world - became the nursery where the seed of the IIT system was planted in 1951. IIT Kharagpur started its journey in the old Hijli Detention Camp in Eastern India, where some of the country's great freedom fighters toiled and sacrificed their lives for India's independence. Spurred by the success of IIT Kharagpur, four younger IITs sprouted around the country in the two following decades, and from these five came thousands of IITians, the brand ambassadors of modern India. It was the success of this one institution at Kharagpur that wrote India's technological odyssey. The Institute takes pride in its relentless effort to provide the best platform for both education as well as research in the areas of science and technology, infrastructure designs, entrepreneurship, law, management, and medical science and technology. IITKGP is not just the place to study technology, it is the place where students are taught to dream about the future of technology and beam across disciplines, making differences enough to change the world.

### Program Fee

AICTE-QIP sponsored participants: Nil  
For others – INR 10,000/- (Ten thousand) + GST @18% per participant

### Accommodation

Accommodation will be provided to the AICTE-QIP sponsored participants at the campus guest house. For other participants, the same will be provided on chargeable basis as per rule.

### Program features

Lectures – 50%  
Lab visit – 25%  
Case studies- 25%

Last day of  
Registration:  
31 October  
2019

### How to Apply

Use the link: <https://erp.iitkgp.ac.in/CEP/courses.htm> to apply ONLINE.



Payment if applicable is to be done **ONLINE** after getting short listed for the program.

## Contact us

**Dr. Mangal Roy**  
**Course Coordinator**

Department of Metallurgical and  
Materials Engineering  
Indian Institute of Technology Kharagpur  
Ph: 03222-283298  
E.mail: mroy@metal.iitkgp.ac.in



**AICTE SPONSORED**  
**Short Term Course**  
**on**

**(QUALITY IMPROVEMENT**  
**PROGRAMME)**

# Advances in Powder Metallurgy and 3D Printing

**(11-16 Nov 2019)**

**Coordinator**  
**Dr. Mangal Roy**

**Organized by**



**Indian Institute of**  
**Technology Kharagpur**  
**Department of Metallurgical and**  
**Materials Engineering**

## Faculty

### **Dr. Mangal Roy**

#### **Course Coordinator**

- Assistant Professor, Department of Metallurgical & Materials Engineering, IIT-KGP.
- Experienced in ceramic biomaterials.
- Teaches powder metallurgy & 3D printing
- Published more than 35 articles, 3 book chapters & presented in several international conferences.

### **Dr. Koushik Biswas**

#### **Course Co-Coordinator**

- Professor, Department of Metallurgical & Materials Engineering, IIT-KGP.
- Specializes in ceramic processing including powder synthesis, thin film processing, hot press sintering.
- Published more than 70 research papers and presented in several international conferences.

## **Other Faculties**

### **Dr. Indranil Manna**

- Professor, Department of Metallurgical & Materials Engineering, IIT-KGP.
- Ex-director of IIT-K & CSIR-CGCRI-Kolkata.
- Experienced in metallurgical and materials processing techniques including laser based additive manufacturing.
- Recipient of multiple international & national award and published more than 250 journal articles, several books and book chapters.

### **Dr. Tapas Laha**

- Professor, Department of Metallurgical & Materials Engineering, IIT-KGP.
- Specializes in mechanical alloying and spark plasma sintering (SPS) processing of CNT and GNP based composite, bulk Metallic glass nanocomposites (BMG-NC).
- Published more than 75 research papers and given several technical talks globally.

## Course Content

### **Advanced powder processing and their characterizations**

Powder synthesis and their physical, structural and chemical characterization techniques.

### **Sintering fundamentals**

Fundamentals of sintering. Driving force, diffusion. Solid and liquid phase sintering

### **Novel sintering techniques**

Microwave sintering, Spark plasma sintering, Pressure assisted sintering, and Field assisted sintering

### **Metallic and ceramic 3D printing techniques**

Design consideration and concepts of 3D printing. Powder bed, fused deposition, binder jetting, rheocasting and newer techniques will be discussed

### **Modelling and simulation techniques in powder metallurgy**

Atomistic calculations, reshaping models, monte carlo methods, discrete element methods, master sintering curves

## Course Overview

The course is designed to talk about the latest developments in powder metallurgy processing and 3D printing.

The widely used ceramic and metallic systems will be discussed emphasizing new technology development and their potential applications. New additive manufacturing technique of 3D printing will be covered in detail.

Applications of Powder Metallurgy in refractory metals, cemented carbides, porous parts, structural parts, aerospace applications, magnetic applications, biological applications will be discussed.

Development of basic concepts of computer models in powder metallurgy and their agreement between simulation and practice will be drawn.