

About IIT Kharagpur



The first ever IIT, originated based on the dreams of the first Prime Minister and a visionary of independent India, Pt. Jawaharlal Nehru is situated a little far off the state's capital, Kolkata.

The 8.5 sq. km lush green campus of IIT Kharagpur which hosts around 22000 inhabitants, away from the hustles of big city, serves as a paradise for education. The position of IIT Kharagpur campus around the historical 'Hijli Detention camp' motivates the residents to thrive for the motto of the Institute "Dedicated to the service of the Nation". 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.

Connectivity

Kharagpur is an important railway junction and is well connected to all parts of the country by rail service (SER). The Institute is approximately 5 Kms from the Kharagpur rail station with the bus-stand adjacent to the rail station.

Contact Us

Dr. Indrani Sen

Department of Metallurgical and Materials Engineering

IIT Kharagpur

Email: indrani.sen@metal.iitkgp.ac.in, ph: 03222 283252

Web: <http://www.iitkgp.ac.in/department/MT/faculty/mt-indrani.sen>

Department of Metallurgical and Materials Engineering

One of the most active Department in the Institute has its inception 65 years back. Since then, the Department has excelled in various fields starting from the fundamentals to the most advanced and state of the art research.



In the way the Department has produced gems of alumnus such as Padma Shri Dr. Srikumar Banerjee (Chairman, Atomic Energy Commission, India), Prof. Indranil Manna (Former Director, CGCRI, IIT Kanpur), Dr. S.V. Kamat (Former Director, DMRL), Prof. Rahul Mitra (Head, MME), Mr. Sundar Pichai (CEO, Google), to name a few. The Department takes pride for its wide spectrum of advanced laboratories both for teaching and research purposes. The MME family aims to establish itself as a global leader in frontier areas of Metallurgical & Materials research and education so that it can effectively cater to the growing needs of industry, academia and research institutions of India.

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.



AICTE – QIP

(Quality Improvement Program)

Indian Institute of Technology Kharagpur

Short Term Course On

1 Week
16-22 June
2019

FRACTURE FATIGUE & FAILURE OF MATERIALS

Last Date for Application: 9th June, 2019. Seats are limited to 30. Candidates will be shortlisted on first come-first serve basis.

<https://sites.google.com/view/mmpmlab-iitkgp>

Program Schedule:

1 week, 16 – 22 June 2019 (9:30 AM – 5.30 PM)

Program Venue:

Department of Metallurgical and Materials Engineering, IIT Kharagpur

Program Attraction:

- **Interesting lectures by faculties from Academia and Industries**
 - Case studies
 - Lab visits
- **Practical Demonstration of experiments**
 - **A visit to Tata Steel may be arranged**

Program Outline:

The course is designed to implement the theoretical knowledge about the mechanical behaviour of material to understand, assess and overcome failure. At the initial stage, fundamental concepts of mechanical properties of materials starting from hardness, tensile and compression behaviour and creep will be discussed. Subsequently, special emphasis will be given on linear-elastic and elastic-plastic fracture mechanics as well as notched- and un-notched fatigue characteristics. Importance of microstructure and environment in controlling the performance of materials will also be highlighted. Next, concepts will be developed on failure and methods for root cause analysis. The course will be equipped with necessary and appropriate audio-visual presentation and case-histories in association with the required lectures and experimental demonstration.

What will you learn?

Along with a broad overview that will developed by the different faculty members, following are the basic topics that will be covered:

Course Content

Introduction : to mechanical behavior of materials - hardness, tensile testing, creep, fracture, fatigue.

Fracture –

- Linear elastic fracture mechanics; Griffith Criterion, stress concentration and stress intensity factors, plane strain fracture toughness, K_{IC}
- Elasto-plastic fracture mechanics, plane stress condition, J_{IC}
- Fracture Toughness testing procedure for ductile and brittle materials
- Impact Toughness -significance of ductile to brittle transition temperature (DBTT), metallurgical factors affecting DBTT
- Laboratory testing of impact toughness and indentation fracture toughness.

Fatigue

- Un-notched Fatigue - Crack initiation
- Stress controlled fatigue (high cycle fatigue, HCF)
- Strain controlled fatigue (low cycle fatigue, LCF)
- Notched Fatigue -Crack propagation -stress intensity factor controlled fatigue
- Laboratory testing of high and low cycle fatigue
- Effect of microstructure, environment and temperature on fracture and fatigue

Failure

- Introduction to Failure Analysis and Root Cause analysis
- Steps for systematic failure analysis
- Case studies on fracture, impact and fatigue based failures.

Who can participate?

Category 1: Faculties/Teachers of AICTE approved degree level Engineering Colleges

Category 2: Faculties/Personnels/Corporates from other Institutions (not approved by AICTE)/ organizations/Industries/

Course Fee

Category 1: No Course Fee for Faculties/Teachers of AICTE approved degree level Engineering Colleges

Category 2:

For Students: Rs. 5,000/-; For Others (Faculty/Industry Personnel): Rs. 10,000/-

Travel, Accommodation and Food

Category 1: TA will be reimbursed with a maximum to AC-3 Tier railway fare on shortest route under normal booking window. Shared boarding and lodging will be provided at the Institute guest house.

Category 2: No TA will be reimbursed. Chargeable single/shared accommodation will be provided on the basis of availability. Breakfast, Lunch and Dinner are included in the course fee.

ABOUT THE PRINCIPLE COORDINATOR



Dr. Indrani Sen, a faculty at the Department of Metallurgical and Materials Engineering is experienced in the field of 'Mechanical Behaviour of Materials'.

Special emphasis on her teaching and research area encompasses the topics of 'Fracture and Fatigue' and 'Microstructure-Property Correlations of Materials'. She is working in this field for more than a decade and published several of research papers in well reputed international journals.

Contact Us

Dr. Indrani Sen

Department of Metallurgical and Materials Engineering, IIT Kharagpur.

Email: indrani.sen@metal.iitkgp.ac.in,

ph: 03222 283252

Web: <http://www.iitkgp.ac.in/department/MT/faculty/mt-indrani.sen>

<https://sites.google.com/view/mmpplab-iitkgp>

COURSE FACULTIES

Experienced and eminent faculties of IIT Kharagpur and Scientists and Researchers from the leading R&D Organizations will be teaching various topics of this course.

Some of the Faculties

Prof. Rahul Mitra (IIT Kharagpur)

Professor and Head Department. of Metallurgical & Materials Engineering, IIT Kharagpur

Teaching Area: Mechanical behaviour of materials – special emphasis on Creep

Dr. Soumitra Tarafdar, NML, Jamshedpur

Chief Scientist & Head, Materials Science & Technology Division, National Metallurgical Laboratory, CSIR-NML, Jamshedpur

Teaching Area: Fracture mechanisms and quantification of resistance to fracture

Prof. K.K. Ray (IIT Kharagpur)

Professor, Department. of Metallurgical & Materials Engineering, IIT Kharagpur

Teaching Area: Fracture of Materials, Stress corrosion fracture

Dr. Goutam Mukhapaddhay, Tata Steel

Head – Metallurgical Lab, Scientific Services, Technology and New Materials Business, Tata Steel Ltd.

Teaching Area: Industrial failure

Dr. Indrani Sen (IIT Kharagpur)

Faculty, Department. of Metallurgical & Materials Engineering, IIT Kharagpur

Teaching Area: Fracture, Fatigue and Failure Analysis - Overview

Dr. Shibayan Roy (IIT Kharagpur)

Faculty, Materials Science Centre, IIT Kharagpur

Teaching Area: Role of Texture in Failure of Materials