

TEQIP-IIISHORT TERM
COURSE

ON

SCIENTIFIC COMPUTING AND
APPLICATIONS TO INDUSTRIAL
PROBLEMS

(NOVEMBER 19 - 23, 2018)

At
Indian Institute of Technology Kharagpur
Kharagpur, India – 721302



Organized by
Department of Mathematics
Indian Institute of Technology Kharagpur
Kharagpur, India – 721302

About the Institute

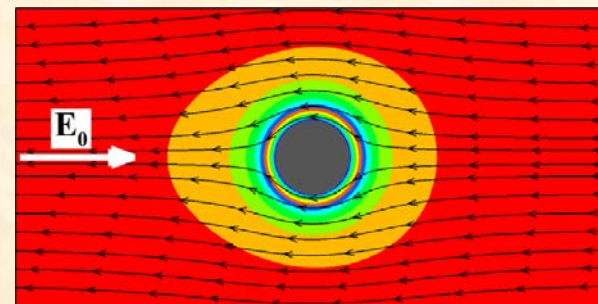
The Indian Institute of Technology Kharagpur was established by the government of India in 1951. The first of the IITs to be established, it is recognized as an Institute of National Importance by the government of India. The institute was established to train scientists and engineers after India attained independence in 1947. It shares its organizational structure and undergraduate admission process with sister IITs. IIT Kharagpur has the largest campus (2,100 acres), the most departments, and the highest student enrolment. Currently IIT Kharagpur has about 550 faculty, 1700 employees and 9000 students in the campus.

About the Department

The Department, since its inception in 1951, has been actively engaged in teaching and research in various branches of mathematical Sciences. The department offers core courses at under graduate level and several courses at postgraduate level. The courses are also designed to prepare students for further graduate work at the Ph.D. level. The Department offers 2-Year M.Sc. programme in Mathematics, 5-Year M.Sc. programme in Mathematics and Computing and M.Tech. programme in Computer Science and Data Processing. Department also enrolls candidates for Ph.D. program. There is a wide spread interaction between mathematics department and various engineering departments in the field of teaching and research.

Course Overview

Scientific computing is a fast-growing, highly interdisciplinary field that involves methods from numerical analysis, high-performance computing and various application fields. It provides better simulation tools aimed to analyze real-life problems. Scientific computing is useful for fabricating and designing industrial machineries and understanding the underlying physics, which may provide the



foundation for upgradation of the existing technology. Miniaturization has been one of the biggest trends in recent years in all areas of technology. Modeling and computer simulation of several microfluidic processes forms a powerful method for the miniaturization of biological and chemical assays.

Objectives

Computation and simulation are increasingly important in all aspects of science and engineering. At the same time writing efficient computer programs to take full advantage of current computers is becoming increasingly difficult. The objective of this course is to introduce the participants the advanced computing techniques, sophisticated computer programming methodology and hands-on experience on using high-end computer server and computing software. Starting from mathematical models (derivation, analysis, and classification; various examples), their numerical treatment will be discussed. The main objectives are:

- *Fundamentals of the advanced numerical techniques*
- *Exposure to modeling several industrial problems*
- *Computer simulation*
- *Hands-on experience on computer simulation in high-end servers*

Course contents

- Overview of sophisticated numerical methods
- Modeling transport processes
- Modeling and simulation of Micro- and nanofluidics processes
- Modeling and simulation of multiphase flows
- Simulation of multi-phase and multi-component fluid flows
- Numerical simulation of transport and separation of micro-particles
- Targeted drug delivery
- Deterministic and stochastic modeling of biological systems
- Computer Lab. and CFD softwares

Training Method

The training methods consist of lecture sessions, hands-on-exercises, discussions on cases and real-life problems.

Course Coordinator

Prof. N. Gnaneshwar & Prof. S. Bhattacharyya
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Resource Persons

Faculty members from IIT Kharagpur and other reputed Institutes/ Universities of India.

Eligibility

Category A: Faculty members of TEQIP-III approved Engineering colleges/ Institutes/ Universities with M.Sc./PhD in Mathematics/ Physics and B.Tech/M.Tech/PhD in Aerospace/ Mechanical/ Chemical/ Metallurgical/ Computer Engineering.

Category B: Industry/ Institute Sponsored Participants with above mentioned academic background.

Registration

Number of participants for the course will be limited to forty.

The course is free for Category A.

The course fee for Sponsored Candidates (Category B) is Rs. 5,000/- for students and Rs. 10,000/- for others. Registration fee includes study materials only.

Accommodation

The Category A participants will be provided free AC accommodation in the Technology Guest House. TA as per the rule will be paid to Category A. Accommodation on payment basis for Category B may be arranged.

Course Schedule & Venue

9:30 am to 6:15 pm with 2 hour lunch break on each day. B R Seth Seminar Hall, Department of Mathematics, IIT Kharagpur, Kharagpur, India.

Important Dates

Last date for receipt of

application:

October 10, 2018

Start of Course:

November 19, 2018

End of Course:

November 23, 2018

How to reach

Situated about 120 km west of Kolkata, Kharagpur can be reached in about 2 hours by train from the Howrah railway station of Kolkata or 3 hours by car from Kolkata Airport. Kharagpur is also connected by direct train services to most major cities of the country. The Institute is about 10 minutes drive (5 km) from the Kharagpur railway station. Private taxi, auto rickshaw or cycle rickshaw can be hired to reach the Institute.

How to Apply

Procedure for applying in IIT Kharagpur online Course Registration portal Use the link:

<https://erp.iitkgp.ernet.in/CEP/courses.htm>

Step to be followed:

1. Sign-Up
2. Verify your email-id (link will be sent to your e-mail)
3. Login
4. Edit Profile (Fill up all the mandatory fields, upload photo and signature)
5. Click on 'APPLY NOW' button.
6. Upload your pdf format id-card.

An e-mail will be communicated from the Continuing Education Program, IIT Kharagpur to the shortlisted applicants stating the payment details.

**** This is one time sign up process in apply to IIT Kharagpur online Course Registration portal.** You can apply to other courses using the same credential.

Details of "How to Pay" is available at <https://erp.iitkgp.ac.in/CEP/courses.htm> upon the candidate getting shortlisted.

Step to be followed for payment:

1. Click on the button "Pay Fees". You will be redirected to IIT Kharagpur Payment Gateway page.
2. Check the details shown and click on Proceed. You will be redirected to State Bank of India MOPS facility (SBIMOPS).
3. Choose the mode of payment and proceed as per instructions.
4. After successful payment through SBI MOPS click on "Click here to return to IIT Kharagpur e-Transaction"

For any queries please send E-mail to: gnanesh8@gmail.com