भारतीय प्रौद्योगिकी संस्थान गुवाहाटी
Indian Institute of Technology Guwahati

Short Term Course (Online)

Finite Element Method: Variational Methods to Computer Application

November 2nd – 6th , 2020

Conducted by :
Department of Mechanical Engineering

Organized by :
Knowledge Incubation for TEQIP
Centre for Educational Technology
URL: http://www.iitg.ac.in/cet

ABOUT THE COURSE:

The finite element method (FEM) is a numerical technique, widely popular among the engineering community, used to simulate any given physical phenomenon. FEM allows for easier modeling of complex geometrical and irregular shapes under practical loading conditions. In this course starting from variational form, the procedures for deriving discrete algebraic equations for different boundary value problems will be discussed. It will be followed by sessions discussing on computer implementations of the same in various applications. Finally, different sessions will be arranged, elucidating the use of finite element method in the field of composite structures, fracture mechanics, manufacturing, and fluid mechanics. Advanced topics like nonlinear finite element method, scope of parallel computing in finite element methods will also be addressed. Separate sessions will be arranged to address the use of commercial software like ANSYS to model various problems related to solid and fluid mechanics.

Faculty members of IIT Guwahati will deliver lecture.

COURSE OBJECTIVE

The objective of the proposed course is to introduce different aspects of finite element method in different fields of engineering for the graduate students and faculty members. With a brief introduction to variational methods, the detailed procedures of finite element formulation will be discussed for various boundary and initial value problems. Moreover, field specific finite formulations and their computer implementations will also be elucidated by the corresponding field experts. In this way, the attendees will also get familiar with the recent developments in these fields. Few sessions will be dedicated to discuss the steps in writing computer programs for solving those problems using FEM, which will enable the attendees in writing their own code or using other available codes.

Topics to be covered

- Variational Methods
- One dimensional Finite element method; Application with bar and beam element
- Generalized one dimensional FEM Program
- Two dimension: Heat transfer and Structural Analysis; FEM Programming
- Time dependent problems in FEM
- Nonlinear Finite element analysis
- FEM in Fracture Mechanics
- FEM in Composite Structures
- Application of FEM in Welding
- FEM in Fluid mechanics
- Forming simulation in ANSYS
- FEM in structural optimization
- Scope of Parallel Programming in FEM

ELIGIBILITY

The course is open to Faculty members/Students from **TEQIP mapped Institutions/Engineering Colleges/ATUs**. No course fee is charged.

IMPORTANT DATES

The last date for the receipt of scanned copy of duly filled sponsored application form by email: 28/10/2020

Intimation of selection: 31/10/2020

SELECTION CRITERIA

Number of seats: 50.
Selection will be based on First cum first served basis. Participants from TEQIP-III mapped institutes will get preference.

ADDRESS FOR CORRESPONDENCE

Dr. Arup Nandy
E-mail: arupn@iitg.ac.in
https://www.iitg.ac.in/arupn/

Dr. Atanu Banerjee
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Department of Mechanical Engineering
Indian Institute of Technology Guwahati
Guwahati- 781 039

Application Form

1. Name (block letters):

2. Sex: ☐ Male ☐ Female

3. Category: ☐ General ☐ Reserved

4. Highest Academic Qualification:

5. Specialization:

6. Designation & pay scale:

7. Name of the organization:

8. Experience:

   (a) Teaching: (b) Industrial:

9. Address for communication:

   Pin code: Mobile No.:

   E-mail:

10. Choice of Accommodation: ☐ Guest House

    ☐ Hostel ☐ Will make my own arrangement.

Please register me for the course on **"Finite Element Methods: Variational Methods to Computer Applications"** to be held in online mode at IIT Guwahati.

I am sending an advance copy of this application by email to the coordinator of the course.

I undertake to send the Hard copy signed by the Head of my Institution.

Place:

Date: *Signature of the applicant*

SPONSORSHIP / NOMINATION CERTIFICTE

Prof/Dr./Mr./Ms./Mrs./.....

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is an employee of our institute and his/her application is hereby sponsored/nominated. The applicant is permitted to attend the short-term course **"Finite Element Methods: Variational Methods to Computer Applications"** at IIT Guwahati during 02/11/2020 to 06/11/2020 if selected.

I also certify that our institute/college is under the "Institution List" of 3rd phase of TEQIP Project of MHRD.

Date Signature of Authority

Designation

Official Seal

Selected participants will be informed by e-mail. The duly sponsored/nominated application form should be e-mailed to:

Dr. Arup Nandy, Dr. Atanu Banerjee

Mechanical Engineering Department

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ABOUT TEQIP

TEQIP conceived in pursuance of the NPE-1986 (revised in 1992) by Govt of India as a long term program to be implemented in different phases. After successful execution of TEQIP II, TEQIP III starts from 2017-18 as Central Sector Scheme with a focus on the Low Income States, Northeast, Hill States and Islands. The third phase of TEQIP is also special in a way that it incorporates twinning arrangements between mentee & mentor institutions with an emphasis on Focused Training (PT) and Focused Interventions from IITs in terms of deliverables and accountability. KIT, established at IIT Guwahati under 2nd phase of TEQIP is a focal point for training Faculty, Staff and students from TEQIP-III institutions in Knowledge Engineering, Content Creation, Improving Teaching, Pedagogy & administrative skills in identified niche areas/disciplines.

ABOUT KIT

KIT (**K**nowledge **I**ncubation Cell for **T**EQIP) at IIT Guwahati functions as a multi-disciplinary as well as interdisciplinary Innovation Incubation Centre with a focus to impart Knowledge, infusing innovation and leading a path to achieve academic excellence. Its activities are in the area of improving quality of technical education, incubator of Innovative Ideas; implementer of contemporary pedagogy practices and development of Learning Content in Technical institutions while mentoring them.

ABOUT IIT GUWAHATI

SNAP OF CAMPUS

IIT Guwahati campus is spread over a sprawling 785 hectares plot of green land on the north bank of the river Brahmaputra around 25 km from the heart of the city. With hills and vast open spaces, the campus provides an ideal setting for training. Details on how to reach IITG Campus are available on the institute website

Website: www.iitg.ac.in