



ACITE Training And Learning (ATAL) Academy Online FDP

On

Advances in Numerical Methods for Engineering Structures: Fundamentals toward Applications

From 25th - 29th Oct, 2021



by

Department of Mechanical
Engineering, Indian Institute of
Technology Ropar
Main Campus, Rupnagar
Punjab- 140001, India.
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About IIT Ropar



IIT Ropar is one of the second generation IITs set up in 2008 by Ministry of Education, Government of India. The institute is located over a serene campus of 525 acres. The Institute is committed to provide state-of-the-art technical education in a variety of fields and for facilitating transmission of knowledge in keeping with latest developments in pedagogy. These two areas of focus will enable students to gain exposure to recent trends in their chosen domains of study and gain practical experience through a wide variety of activities the Institute facilitates in its own campus and arranges industry and other institutes. The atmosphere of vibrancy in the campus is delivering fantastic results in the span of a decade, the Times Higher Education World University Ranking 2020 is an example.

About the Department

Department of Mechanical engineering was established in 2008, and offers B.Tech, M.Tech (Design, Thermal and Manufacturing) and PhD programmes. It is having highly qualified and motivated faculty members with good record of research and development activities. Faculty research interests include, but not limited to the following areas: Computational modelling, additive manufacturing, bio-mechanics, Fuel cell design and analysis, surface engineering, Combustion, Surface texturing etc.

FDP objectives

The objectives of this FDP is to acquaint the participants with the mechanics and recent advancements in computational mechanics through lectures covering both fundamentals and applications. The content covers a range of topics including material modelling, composite mechanics, finite element methods and introduction to advanced numerical methods with the applications.

Contents of FDP to be covered

- Introduction to Finite Element Method
- Fundamentals of Fracture and Damage Mechanics
- Extended-FEM for fracture mechanics
- Meshfree methods for the failure analysis of engineering structures
- Fracture modelling of piezoelectric materials under thermal-mechanical-electrical loading
- Failure Analysis of Engineering Structures using XFEM
- Gradient Enhanced Damage Models
- Micromorphic Computational Homogenization Approach for Composite materials
- Structural Shape and Size Optimization for Auxetic Structures
- Introduction to Phase field modelling and Applications
- Introduction to Material Point Methods
- Polygon Finite Element Methods: Recent Trends and Advancements

Targeted Participants

- Ph.D./ P.G. degree students in any branch of engineering / technology / sciences.
- Regular faculty in early stage career in University/ degree/ diploma level institute in the fields of engineering / technology/ sciences.

Session wise Time schedule: 3 sessions per day [14 for lectures, 1 for valedictory/ feedback

Date/Time	9:30 am – 11:00 am		11:30 am -1:00 pm		2:30 pm – 4:00 pm
25 Oct, 2021 Monday	Fundamentals of Fracture and Damage Mechanics	Break	Introduction to Finite Element Method	Brea k	Extended-FEM for Fracture Mechanics Problems
26 Oct, 2021 Tuesday	Failure Analysis of Engineering Structures using XFEM		Meshfree Methods for Failure Analysis of Engineering Structures		Fracture Modelling of Piezoelectric Materials under Thermal-Mechanical-Electrical Loading
27 Oct, 2021 Wednesday	Gradient Enhanced Damage Models for Quasi-brittle Structures		Meditation		A micromorphic computational homogenization Approach for engineering materials
28 Oct, 2021 Thursday	Introduction to Phase Field Modelling and Applications		Material Point Method and phase field fracture modelling		Introduction to Extended Isogeometric Analysis
29 Oct, 2021 Friday	Structural Shape and Size Optimization for Auxetic Structures		Polygonal finite element method - recent trends and advancements		Valedictory/Feed-back

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