

FAILURE OF MATERIALS

Overview

Systematic analysis of engineering failures is essential for improving engineering designs and make them failure tolerant. However, effective analysis of failure requires knowledge of a variety of issues which are rarely, if ever, taught in a single course. While understanding the growth and propagation of existing flaws is based on fracture mechanics, clues about the nature of failure can also be obtained from the microstructure of the fractured surfaces. This requires grounding in materials science and advanced microscopy. The process by which defects nucleate in a structure, either over long periods of operation or in an aggressive environment, involves an intricate interplay between materials science and mechanics. Experimental techniques in failure analysis depend on a wide range of methods requiring knowledge of optics, electron-matter interactions and the like. Finally, computational methods play a significant role in failure analysis.

The primary objectives of the course is to introduce the participants to aspects of mechanics, materials science and experimental/computational methods that are relevant to the understanding of nucleation and growth of defects in structures and their ultimate failure.

Course participants will learn these topics through lectures, case studies, hands-on experiments and computations.

Modules	Failure of Materials: Dec 14-Dec 23 Number of participants for the course will be limited to thirty.
You Should Attend If...	<ul style="list-style-type: none">▪ You are a practising engineer/scientist or academic interested in understanding how materials fail and how we should analyse failure.▪ You are a Masters or PhD student working in areas related to fracture and failure
Fees	The participation fees for taking the course is as follows: Participants from abroad : US \$200 Industry/ Research Organizations: INR 5000 Faculty from academic Institutions: INR 2000 Students currently enrolled in Masters or PhD programmes: No charges The above does not include accommodation and food. We may be able to provide students with accommodation in our hostels provided they let us know their travel plans well in advance.

The Faculty



Prof. Daniel Rittel holds the Zandman Chair in Experimental Mechanics and is the Deputy Senior Vice President, Technion, Israel. His research interests include Experimental Mechanics, fracture mechanics (static and dynamic, damage), mechanical properties of materials, mechanical metallurgy, failure analysis of materials & mechanical systems, dental biomechanics and geophysics. He has been a visiting faculty at Caltech, University Carlos III Madrid and University of Innsbruck.



Prof. P. Venkitanarayanan is Professor and Head of the Mechanical Engineering Department at IIT Kanpur. His research interests include Experimental solid mechanics, dynamic fracture mechanics, high strain rate behavior of materials and graded composites.



Prof. Sumit Basu is Professor of Mechanical Engineering at IIT Kanpur. His research interests are computational materials science, static and dynamic fracture mechanics.

Course Co-ordinator

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