



# MASS MOMENTUM AND ENERGY BALANCES IN ENGINEERING ANALYSIS

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**TYPE OF COURSE** : Rerun | Core | UG/PG  
**COURSE DURATION** : 8 Weeks (24 Jan' 22 - 18 Mar' 22)  
**EXAM DATE** : 27 Mar 2022

**PRE-REQUISITES** : 10+2 Science and Mathemat

**INTENDED AUDIENCE** : Aerospace/ Mechanical/ Chemical/ Ocean/ Cryogenic/ Marine/ Naval/Energy/  
Petroleum/ Environmental/ Geological Engineering

**INDUSTRIES APPLICABLE TO** : All process and allied industries

## **COURSE OUTLINE :**

The course is intended to revisit the conservation laws as a primer for the study of the transport phenomena and thermodynamics. Both macroscopic and microscopic approaches in applying these laws will be dealt with. The students will learn how to make mass-, momentum- and energy-balances by going through the course.

## **ABOUT INSTRUCTOR :**

Prof. Pavitra Sandilya has been teaching at the Cryogenic Engineering Centre of IIT Kharagpur since 2002. I have been offering both core and elective courses on mass transfer, separation processes, LNG, CFD etc. to both UGs and PGs. My research area encompasses process intensification, non-conventional energy, carbon capture, cryogenic storage, catalyst development, hydrogen separation etc.

## **COURSE PLAN :**

**Week 1:** Introduction to linear algebra (vectors, tensors, and matrix operations)

**Week 2:** Introduction to linear algebra (vectors, tensors, and matrix operations)

**Week 3:** Introduction to numerical methods (roots of nonlinear algebraic equations, regression, interpolation etc.)

**Week 4:** Introduction to numerical methods (numerical integration/differentiation, solution of ordinary and partial differential equations)

**Week 5:** Macroscopic approaches to mass, momentum and energy balances

**Week 6:** Microscopic approach to mass balance

**Week 7:** Microscopic approach to momentum balance

**Week 8:** Microscopic approach to energy balance