Department of Mathematics

MTH426: An Introduction to Mathematical Modelling 3-0-0-0 [09]

Learning objectives

At the end of the course, students should be able to translate real-world problems into mathematical models to describe, analyze, and predict complex phenomena.

Course Contents

Introduction: What is Mathematical modelling? Role of Mathematics in problem solving; Transformation of physical model to Mathematical model with some illustrations of real world problems.

Dimensional analysis: Units and dimensions, Dimensionless quantities, Unit-free equations, Buckingham π-theorem.

Discrete models: Modelling change with difference equations; Some case studies with analysis.

Continuous models: Modelling change with differential equations; Some case studies with analysis.

Stochastic models: Introduction; Some case studies with analysis.

Instructor : S Ghorai **Email** : sghorai@iitk.ac.in
Lecture : M T Th: 16:00 **Venue** : FB557

Course Organization

All notices for the course will be sent by email to the course email MTH426@iitk.ac.in. Assignments will be provided in pdf format.

Exams and quizzes

There will be a mid-semester and an end-semester examinations.

Grading policy

Attendance-10% (min 80% attendance), Midsem-35%, Endsem-55% (*Use of unfair means in exams will attract penalties.)*

Appearance in the end-semester examination is mandatory

Attendance

Attendance will be taken in the classes.

References

- Mathematical Modeling: A case study approach R Illner, C Sean Bohun, S McCollum, and T van Roode
- Principles of Mathematical Modeling Clive L. Dyne
- A First Course in Mathematical Modeling - Frank R. Giordano, Maurice D. Weir, and William P. Fox