Department of Mathematics
Faculty of Mathematics & Computer Science
PhD, Mathematics

Course Code	AM 504
Course Title	Advanced Mathematical Modeling
Course Credits	02

Course objectives:

Introduce some areas of the physical in which mathematics has a significant contribution to make. Present different modelling approaches to understand a wide variety of real life phenomena.

Minimum Pre-requisites:

Numerical Analysis & Methods.Theory of Ordinary and Partial Differential Equations.Numerics of Ordinary and Partial Differential Equations

Course structure:

*Deterministic Analysis of Observations:*Data Transformations, Model Development, Model Evaluation, The Advantage of Modeling; *Stochastic Analysis of Observations:*Model Errors, Optimal Linear Models, Optimal Quadratic Models, Optimal Power and Exponential Models; *Deterministic States:*Dimensional Analysis and Similarity, Applications of Low-Complexity, Applications of Medium-Complexity, Applications of High-Complexity; *Stochastic States:*Probability Density Functions, Models for Probability Density Functions, Data Analysis, Real Distributions; *Deterministic Changes:*Linear Changes, Linear Changes with Delays, Nonlinear Changes, Difference and Differential Equations.

Reading suggestions:

- S. Heinz, Mathematical Modeling, 1st Edition, Springer-Verlag, 2011.
- M Meerschaert, Mathematical Modeling, 3rd Edition, Academic Press, 2007.

- Edward A. Bender,An Introduction to Mathematical Modeling, , Dover Books on Computer Science, 2000.
- Walter J. Meyer, Concepts of Mathematical Modeling, Dover Books on Mathematics, 2004.

Evaluation and Weightage:

- Computer Assignment 1: 10% Weightage
- Computer Assignment 2: 10% Weightage
- Lab: 10% Weightage
- Mid Term Exam: 30% Weightage
- End Term Exam: 40% Weightage