Department of Mathematics
Faculty of Mathematics & Computer Science
M.Sc. (Applied Mathematics), 2ⁿᵈ Semester

Course Code	AM 205
Course Name	Mathematical Modelling & Simulations
Course Credits	04

Course objectives:

Understand nonlinear systems of differential equations through phase space analysis. Learn how to set up, analyze and interpret mathematical models. Learn how to communicate mathematical ideas in writing.

Minimum pre-requisites:

AM 102: Numerical Analysis & Methods
AM 103: Ordinary Differential Equations & Applications
AM 202: Numerics of Ordinary Differential Equations

Course structure:

INTRODUCTION TO MATHEMATICAL MODELLING: Mathematical models, Some modelling approaches, Modelling for decision-making;**MODELING CONTINUOUS PROCESSES**: Models of single populations: Exponential growth, Density dependent growth, Limited growth with harvesting, discrete population growth and chaos, Time-delayed regulation, interacting population models; partial differential equation models: diffusion process and diffusion models, wave propagation, heat flow.**PROBABILISTIC MODELS**: Discrete Probability Models, Continuous Probability Models, Stochastic models: Markov Chains, Markov Processes, Linear Regression.

Reading Suggestions:

- Mathematical Modelling with Case Studies 2nd Edition, Belinda Barnes and Glenn Robert Fulford.
- Mathematical Modeling, 4th Edition, Mark M. Meerschaert.
- Mathematical Modelling 1st Edition, D N P Murthy and N W Page.

- Handbook of Dynamic System Modeling, Paul A. Fishwick, Chapman & Hall/CRC Computer & Information Science Series.

Evaluation and weightage:

- Quiz 1   :10%
- Quiz 2   :10%
- Lab/Assignment   :10%
- Mid Term Exam   :30%
- End Term Exam   :40%