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

Course Code	AM 604
Course Title	Modelling of Biological Systems
Course Credits	04

Course Objectives:

To equip the students with underlying concepts of Mathematical modelling. Learn how to set up, analyze and interpret mathematical models.

Minimum Pre-requisites:

Theory of Ordinary Differential Equation, Basics of Partial Differential Equations, Numeric of Ordinary Differential Equation, Computer Programming.

Course Structure:

Unit 1: Methods for analysing nonlinear models, concepts of local and global stability, periodic and non-periodic solutions, Bifurcations, optimal control theory.

Unit 2: Mathematical methods for dynamic state variable models in biomathematics, especially difference and differential equations, with applications including models for population dynamics, pattern formation, and enzyme kinetics, epidemic models, neural dynamical models, dynamical financial models.

Unit 3: Modelling with partial differential equations as applied to real problems in biology. Review of diffusion and conservation laws. Waves and pattern formation. Chemotaxis and other forms of cell and organism movement.

Reading suggestions:

- Murray, James Dickson. Mathematical Biology I. An Introduction. New York: Springer, 2002.
- Murray, James D. Mathematical biology II: spatial models and biomedical applications. New York: Springer, 2001.

- Chou, Ching-Shan, and Avner Friedman. Introduction to mathematical biology. Switzerland: Springer, 2016.
- Bocharov, Gennady, et al. Mathematical immunology of virus infections. Springer International Publishing, 2018.
- Zabczyk, Jerzy. Mathematical control theory. Springer International Publishing, 2020.

Evaluation and weightage:

- Computer Lab: 20%
- Assignment: 10%
- Mid Term Examination: 30%
- End Term Examination: 40%