

SUBJECT: Mathematical Modeling

Modelling process, identification and formulation

1. Discrete models

- Discrete dynamical systems and compartmental analysis
- Fixed point and stability
- System of recurrence relations

2. State models

- State diagrams
- Analysis of matrix equations
- Deterministic state models
- Stochastic model and Markov chain

3. Empirical modelling and regression

- Fitting linear functions to data
- Covariance and correlation
- Standard regression and multiple regressions
- Least-squares method
- Curvilinear models
- Linearization, Intrinsically linear and nonlinear
- Interpolation

4. Differential equations (ODE and PDE)

- Models with differential equations
- Analysis of slope fields, equilibrium solution and stability
- Phase line and plane analysis
- Models of the interaction of two populations

5. Models and applications

- Population growth modeling
- Newton's law of heating and cooling
- SIR model
- Modeling of chemical reactions
- etc.