Indian Institute of Science

Department of Bioengineering

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Course Title:	Mathematical Methods for Bioengineers
Course Code:	BE 207
Couse Schedule:	Jan Semester
Credits:	3:0
Course Coordinator:	Prof. Narendra M Dixit and and Prof. Mohit Kumar Jolly
Pre-Requisites:	None
Eligibility:	Only for students enrolled in the M. Tech. or Ph.D. program at BE IISc

Description

The course offers exposure to basic mathematical and statistical principles and techniques of importance to bioengineers.
The topics to be covered include: linear algebraic equations; eigenvalues and eigenvectors; nonlinear algebraic equations; fixed-point iteration and optimization methods; linear and nonlinear least squares; first and second order ordinary differential equations; Euler, RK4, and predictor-corrector methods; discrete and continuous random variables; Markov processes; Gillespie algorithm; Monte Carlo methods; hypothesis testing; parametric and non-parametric statistical tests.

Grading policy

Assignments (3-4 through the semester): 15%, Quizzes (3-4 through the semester): 20%, Midterm Exam: 15%, Final Exam: 50%

Course outcomes

Facility with basic mathematical and statistical techniques of relevance to bioengineers; facility with associated numerical methods; exposure to the use of mathematical methods in biological systems.

Resources

1. Gilbert Strang, Differential equations and linear algebra, Wellesley-Cambridge,2015
2. Michael Heath, Scientific computing: an introductory survey, McGraw Hill,2005
3. Steven Strogatz, Nonlinear dynamics and chaos, Westview, 2015
4. Sheldon Ross, Introduction to probability models, Academic, 2014
5. Sheldon Ross, Introductory statistics, Academic, 2010