Name of the Programme: M.Sc. Biotechnology

Course Code: GBT-523

Title of the Course: MATHEMATICS FOR BIOLOGISTS

Number of Credits: 2

Effective from AY: 2022-23

Pre-requisites for the Course:	No prerequisite is required.	
Course Objectives:	1) To give conceptual exposure to essential contents of mathematics 2) To enable them to perform quantitative analysis in biology.	
Content:	**MODULE I** • Linear equations, functions: slopes-intercepts, forms of two-variable linear equations; • Constructing linear models in biological systems. • Quadratic equations (solving, graphing, features of, interpreting quadratic models, etc.) • Introduction to polynomials, graphs of binomials and polynomials; Symmetry of polynomial functions, • Basics of trigonometric functions, Pythagorean theory. • Graphing and constructing sinusoidal functions, imaginary numbers, complex numbers, adding-subtracting-multiplying complex numbers, • Basics of vectors, introduction to matrices.	**No of hours** 15
	MODULE II • Images as 2D/3D Functions, Functions and its derivatives, Computing Derivatives of Curves, Rules for Calculating Derivatives. • Curvature and Second Derivative Plotting Curves, Numerical Calculation of Derivatives., Function, Derivatives and Series Expansion Differential calculus (limits, derivatives), integral calculus (integrals, sequences, and series, *etc*.). • Population dynamics; oscillations, circadian rhythms,	15

	developmental patterns, • Symmetry in biological systems, fractal geometries, size limits & scaling in biology, • Modelling chemical reaction networks and metabolic networks	
Pedagogy:	Lectures, tutorials, assignments	
References/ Readings:	1. S.K. Aggarwal, Bio Mathematics. Alps Book Publishers, 2008. 2. M. Aitken, B. Broadhursts, S. Haldky, Mathematics for biological scientists. Garland Science, 2009. 3. N. Bairagi, Introductory Mathematical Biology. U. N. Dhur and Sons Private Limited Publisher, 2021. 4. P.C. Foster, Easy mathematics for biologists. Taylor and Francis, 1999. 5. R. Robeva, Mathematical concepts and methods in modern,Biology using Modern Discrete Models. Academic Press, 2013. 6. K. A. Stroud, D. J. Booth. Foundation Mathematics. Palgrave Macmillan, 2009	
Course Outcomes:	1. Will be able to apply the concepts of mathematics in Biology 2. Will recognize the importance and value of mathematical thinking. 3. Use of mathematics to describe biological processes and their use in problem-solving. 4. Able to apply math skills to understand the diverse phenomena that exist in biological system.	

(Back to top)