

Anekant Education Society's  
**TULJARAM CHATURCHAND COLLEGE OF ARTS, SCIENCE & COMMERCE, BARAMATI**  
**AUTONOMOUS INSTITUTE**  
**DEPARTMENT OF ZOOLOGY**

## Course Title: Certificate Course in Mathematics for Life Sciences

### Course Objectives:

1. To bridge the gap between life sciences & mathematical sciences.
2. To develop the interdisciplinary approach among the students.
3. To develop inductive & deductive reasoning among the students of both streams.
4. To develop the ability & habit among students to use appropriate mathematical tools in life sciences to evaluate, interpret, conclude their research outcomes.

### Course Outcomes:

1. Students develop the similar approach in studies of both sciences.
2. Students develop the habit of inductive & deductive reasoning while study of both sciences.
3. Students become aware about use of appropriate mathematical tool in life sciences.
4. Students can relate between concepts of both sciences.

### THEORY (12 periods):

Sr. No	Topic	Lectures
<b>1</b>	<b>Periodic Functions</b>	<b>04</b>
1.1	Biological rhythms	
1.2	Polar Coordinates and honey bee communication	
1.3	Control of equilibrium in the guppy	
1.4	Phyllotaxis and Fibonacci numbers	
1.5	Population dynamics	
<b>2</b>	<b>logarithmic functions and Exponential functions</b>	<b>04</b>
2.1	Microbial growth rate	
2.2	Oxygen consumption	
2.3	Beer-Lambert Law	
2.4	Allometric function	
2.5	Linear regression	
<b>3</b>	<b>Population Genetics</b>	<b>04</b>
3.1	Hardy Weinberg equilibrium	
3.2	Blood group typing	
<b>4</b>	<b>Leslie matrix models</b>	<b>04</b>
4.1	Equilibria and limited population growth	
4.2	Models of limited population growth	
<b>5</b>	<b>Matrix Algebra</b>	<b>04</b>
5.1	Ecological succession	
<b>6</b>	<b>Derivatives</b>	<b>04</b>
6.1	Photosynthetic rate	
6.2	Carbon dating	
<b>7</b>	<b>Integration</b>	



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	7.1	Pesticides	
	7.2	Salinity	

**Practicals (18 Periods)**

<b>1</b>	<b>Periodic Functions</b>	<b>04</b>
	Practicals based on Periodic functions related to <b>(Any two)</b> 1. Biological rhythms 2. Polar Coordinates and honey bee communication 3. Control of equilibrium in the guppy 4. Phyllotaxis and Fibonacci numbers 5. Population dynamics	
<b>2</b>	<b>Logarithmic functions and Exponential functions</b>	<b>04</b>
	Practicals based on logarithmic functions & Exponential functions related to- <b>(Any two)</b> 1. Study of Microbial growth rate by exponential function 2. Study of Oxygen consumption in crab by logarithmic function 3. Study of Beer-Lambert Law by use of exponential function. 4. Study of Allometric growth rate in Elephant. 5. Study of rate of cell death by Linear regression	
<b>3</b>	<b>Population Genetics</b>	<b>02</b>
	Practicals based on <b>Population Genetics</b> related to <b>(Any one)</b> 1. Study of various populations to verify the Hardy Weinberg equilibrium. 2. Study of gene frequency of Blood group in defined population.	
<b>4</b>	<b>Leslie matrix models</b>	<b>02</b>
	Practicals based on <b>Leslie matrix models</b> related to 1. Study of limited population growth by Leslie matrix model. 2. Relationship between various models of limited population growth.	
<b>5</b>	<b>Matrix Algebra</b>	<b>02</b>
	Practicals based on <b>Matrix Algebra</b> related to 1. Study of predictions of Ecological succession by Matrix Algebra.	
<b>6</b>	<b>Derivatives</b>	<b>02</b>
	Practicals based on <b>Derivatives</b> related to 1. Study of effect of light intensity on Photosynthetic rate. 2. Determination of age of fossil by Carbon dating.	
<b>7</b>	<b>Integration</b>	<b>02</b>
	Practicals based on <b>Integration</b> related to 1. Determination of lethal dose of Pesticides. 2. Study of Salinity of water and its effect on fish population.	

  
**Head**

**Department of Zoology**

