## PIM101 BASIC MATHEMATICS

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|---|---|---|---|
| 3 | 1 | 0 | 3.5 |

**Prerequisite(s): None**
**Course objective:** The objective is to develop basic mathematical skills required for biological and chemical studies.

**Algebra:** Linear and quadratic equations; Complex numbers, Argand plane and polar representation of a complex number.
Factorial n. (n!)Permutations and combinations, Random experiments; outcomes, sample spaces (set representation). Events; occurrence of events, exhaustive events, mutually exclusive events, Probability of an event: simple mathematical problems involving shuffling of cards, tossing of coin and rolling of a die.

**Trigonometry:** Review of trigonometric functions, sum and product formulae for trigonometric functions,Identities related to sin (2x), cos(2x) and tan (2x).

**Determinants and Matrices:** Matrices, Operations on Matrices, Determinants and its properties, singular and non-singular matrices, Adjoint and inverse of a matrix and its properties, Solution of system of linear equations using Cramer's rule.

**Differentiation:** Review of functions, Limit, Continuity and Differentiability, Differentiation of standard functions (polynomials, trigonometric, inverse trigonometric exponentials and logarithmic), Product rule, Quotient rule.

**Applications of derivatives**: rate of change of bodies, increasing/decreasing functions, maxima and minima.

**Integration:**
Integration as inverse process of differentiation.Integration by substitution, by partial fractions and by parts(polynomials, trigonometrically functions only), Evaluation of simple integrals of the following types and problems based on them:

$$\int \frac{dx}{x^2 \pm a^2}, \int \frac{dx}{\sqrt{x^2 \pm a^2}}, \int \frac{dx}{\sqrt{a^2 - x^2}}, \int \sqrt{a^2 \pm x^2}\, dx, \int \sqrt{x^2 - a^2}\, dx$$

**Coordinate geometry:**

Brief recall of two dimensional geometry from earlier classes. Distance formula, Slope of a line and angle between two lines. Various forms of equations of a line: point-slope form, slope-intercept form.Circles (in standard form ).

**Course Learning Outcome*:***
Students will be able to
1. Solve various problems on Algebra and Trigonometry
2. Solve problems on determinants and matrices and subsequently the solutions of system of linear equations.

3. Evaluate differentiation of standard functions various problems.
4. apply different methods of integration such as method of substitution, by partial fractions and by parts.
5. findequations of straight line and circle under given conditions.

**Recommended Books**

1. Mathematics, A Text book (Parts I & II), 2011, NCERT, New Delhi.
2. Thomas, G.B. and Finney, R.L. Calculus and Analytical Geometry, Pearson Education. (2007) 9th edition.
3. Shanti Narayan, Differential and Integral Calculus, S. Chand (2005).
4. Krishnamurthy V.K., Mainra V.P. and Arora J.L. An introduction to Linear Algebra. Associated East WestPress (2007).

**Evaluation Scheme:**

| Sr.No. | Evaluation Elements | Weight age (%) |
|---|---|---|
| 1. | MST | 30 |
| 2. | EST | 45 |
| 3. | Sessionals (May include assignments/quizzes/Lab Evaluation) | 25 |