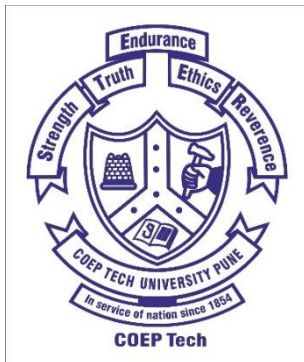
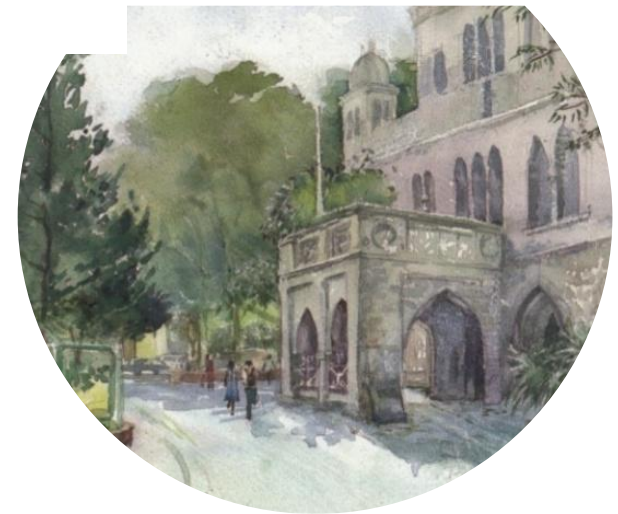


Department of Applied Sciences & Humanities



WELCOME

Mathematics Section



THE ROADMAP

Your First Year, At a Glance

4 courses offered across two semesters to build your foundation

SEMESTER I

Basic Science Course · Mathematics-I

Matrix Algebra and Calculus.
MAC 3 credits

Linear Algebra. LA 3 credits

SEMESTER II

Basic Science Course · Mathematics-II

Vector Calculus and Differential Equations. VCDE 4 credits

Probability and Statistics. PS 4 credits

COURSE DETAILS

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EVALUATION SCHEME

MSE-30

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ESE-50



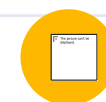
KEY LEARNING

- **Matrix Algebra:** Gauss Elimination method; Eigenvalues and Eigenvectors
- **Differential Calculus:** Extreme Values of Functions, curve sketching, Applied Optimization Problems. Partial Derivatives
- **Integral Calculus:** Reduction formulae, Beta function and Gamma Function; Multiple Integrals



IMPORTANCE

- Lays the groundwork with calculus and matrices and builds structural foundations.
- Provides the mathematical foundation for engineering problem-solving such as circuit analysis, structural design, mechanics, and systems modeling.
- Essential for modeling systems, optimization, and understanding advanced topics like machine learning and physics.



APPLICATION AREAS

- **For Electronics and Telecommunication, Electrical, Instrumentation, Civil, Mechanical, Manufacturing, Metallurgy branches:** Provides the mathematical foundation for engineering problem-solving (circuit analysis, structural design, mechanics).
- **For Computer, Artificial Intelligence & Machine Learning branches:** Essential for modeling systems, optimization, and topics like machine learning and physics (e.g., PCA, gradient descent).

COURSE DETAILS

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EVALUATION SCHEME

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KEY LEARNING

- **Matrices and Linear Equations:** Gauss elimination method, Vector spaces, Row and Column spaces
- **Linear mappings:** representation by matrices, rank-nullity theorem, eigenvalues, eigenvectors and their basic properties.
- **Inner product spaces:** diagonalization of special matrices, geometric applications of linear transformations, quadratic forms.



IMPORTANCE

- Deepens structural understanding with vector spaces
- Enables understanding of transformations, algorithms, and geometric applications relevant to circuit design, structural analysis, and control systems.
- Core to computer science, electrical engineering, and data science.



APPLICATION AREAS

- **For Electronics and Telecommunication, Electrical, Instrumentation, Civil, Mechanical, Manufacturing, Metallurgy branches:** Deepens structural understanding with vector spaces and transformations; supports circuit design, structural analysis, and control systems.
- **For Computer, Artificial Intelligence & Machine Learning branches:** Builds grounding for machine learning, cryptography, and quantum mechanics; core to graphics, image processing, and dimensionality reduction.

COURSE DETAILS

EVALUATION SCHEME

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MSE-30**TA-20****ESE-50****KEY LEARNING**

- **Ordinary Differential Equations:** Euler-Cauchy equations; Non-homogeneous equations; Laplace Transform; Fourier Series.
- **Vector Calculus:** Vector-valued functions, gradient, directional derivatives, divergence, curl, line, surface and volume integrals
- **Partial Differential Equations:** one-dimensional diffusion equation, first and second order one-dimensional wave equation.

**IMPORTANCE**

- Applies mathematical foundations to physical systems through differential equations and vector calculus.
- Fundamental for modeling physical systems such as heat transfer, vibrations, and fluid dynamics; widely applied in mechanical, civil, and electrical engineering.

**APPLICATION AREAS**

- **For Electronics and Telecommunication, Electrical, Instrumentation, Civil, Mechanical, Manufacturing, Metallurgy branches:** Applies foundations to physical systems via differential equations and vector calculus; models heat transfer, vibrations, fluid dynamics, and electromagnetics.
- **For Computer, Artificial Intelligence & Machine Learning branches:** Strengthens analytical skills for real-world problems; models dynamic systems used in simulations and control algorithms.

COURSE DETAILS

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EVALUATION SCHEME

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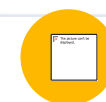
KEY LEARNING

- **Introduction to 'R' Language**
- **Descriptive statistics:** Measures of location and variation. Visualization of data: probability theory, Probability distributions and random variable, Binomial, Poisson, Normal, Exponential. Normal, Central limit theorem, Estimation, basic tests such as t-test, z-test, F-test, χ^2 –test, Nonparametric tests: Sign test, Wilcoxon signed rank test. Linear and multivariate Regression.



IMPORTANCE

- Equips students to handle uncertainty, data, and real-world variability.
- Critical for data-driven decision-making in engineering, AI, and research.
- Equips students with statistical tools for reliability, quality control, and predictive modeling.
- R programming integration ensures practical computational skills for modern applications across all branches.



APPLICATION AREAS

- **For Electronics and Telecommunication, Electrical, Instrumentation, Civil, Mechanical, Manufacturing, Metallurgy, Computer, Artificial Intelligence & Machine Learning branches:** Equips students to handle uncertainty and data; critical for data-driven decisions, quality control, reliability, and predictive/ML modeling.

Two semesters Four Courses

Paths

Sem I: **Linear Algebra**



Sem-II: **Probability and
Statistics**

Sem-I: **Matrix Algebra and Calculus**



Sem II: **Vector Calculus &
Differential Equation**



Sem II: **Probability and Statistics**

APPLIED SCIENCES and HUMANITIES DEPARTMENT (Mathematics)