**ICT 3107 - Matrices, Vectors, Fourier Analysis and Laplace Transforms**

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| **Theory of Matrices**: Concepts of matrices, types of matrices, transposes, determinant, Sarrus’ rule, Laplace expansion, inverse matrix, elementary row operations of matrices (echelon form and row reduced echelon form of matrices), LU-Decomposition and rank.Systems of linear equations and it’s solution by Cramer’s Rule, Gaussian elimination method and inverse matrix method, Kronecker-Capelli theorem. **Diagonalization of matrices:** Introduction, eigenvalues and eigenvectors, diagonalization of matrices and the Cayley-Hamilton theorem. |
| **Vectors:** Vectors and Scalars, Algebra of vectors, Scalar triple product, Vector triple product, Vector differentiation and vector integration, Gradient, Divergence and Curl, Cartesian, Spherical, Polar and Cylindrical system. |
| **Fourier analysis:** Real and complex form of Fourier series, Fourier Integral, Fourier transforms and their uses in solving boundary value problems. |
| **Laplace Transforms**: Introduction, Laplace transform of elementary function, Properties of Laplace Transforms, Inverse Laplace transforms, and their properties, Convolution theorem, Heaviside’s expansion formula and their Applications. |