DSM101 Mathematical Foundations for Data Science

Level: 1
Credit Units: 5 Credit Units
Language: ENGLISH
Presentation Pattern: EVERY JAN

Synopsis:

Mathematical Foundations for Data Science will introduce students to the essential matrix algebra, optimisation, probability and statistics required for pursuing Data Science. Students will be exposed to computational techniques to perform row operations on matrices, compute partial derivatives and gradients of multivariable functions. Basic concepts on minimisation of cost functions and linear regression will also be taught so that students will have sound mathematical foundations to proceed and understand standard algorithms in Data Science and Machine Learning.

Topics:

- Matrix operations
- Singular value decomposition
- Functions of several variables
- Limits
- Continuity
- Partial derivatives
- The chain rule
- Directional derivatives
- Gradient vectors
- Maxima and minima
- Sample statistics
- Linear regression

Learning Outcome:

- Determine the limit or partial derivatives of a multivariate function.
- Solve for the gradient or directional derivative of a multivariable function in a given direction.
- Show the linear transformations on means and variances/covariances of datasets.
- Comment on results obtained by singular value decomposition of a matrix.
- Apply linear regression models in data science.
- Use Python to perform calculations in matrix algebra, differential multivariable calculus and statistical analysis.

Assessment Strategies (Evening Class):

Components	Description	Weightage Allocation (%)
Overall Continuous Assessment	COMPUTER MARKED ASSIGNMENT 1	10
	TUTOR-MARKED ASSIGNMENT 1	20
Overall Examinable	Written Exam	70

Components		
Total		**100**