

# Mathematical Methods for Machine Learning

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Ngày 16 tháng 1 năm 2025

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[Tie20] VŨ HỮU TIỆP. *Machine Learning Cơ Bản*.

[DF023] MARC PETER DEISENROTH, A. ALDO FAISAL, CHENG SOON ONG. *Mathematics for Machine Learning*. 2023.

**Target Audience.** Mainly: Engineering- & CS undergraduate students.

Note: Mathematics undergraduate students, especially academic-oriented (researchers), need much more rigorously theoretical mathematical foundations for ML.

## Goal/Objective

Learn enough mathematics to be able to balance our comprehension in both mathematical- & technical (engineering) aspects of Machine Learning: Adjust “suitable” coefficients  $\alpha, \beta, \gamma \in (0, 1)$  s.t.  $\alpha + \beta + \gamma = 1$  &

$$\text{Maximize Goal(What, How, Why)} := \alpha \text{What} + \beta \text{How} + \gamma \text{Why.} \quad (1)$$

where the functional  $\text{Goal(What, How, Why)}$  depends on your target job(s) & purpose(s).

# Audiences & Goals

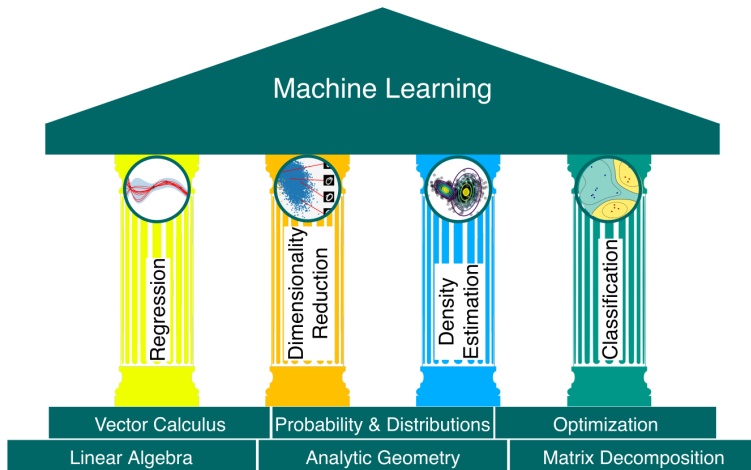
## Engineering

Engineering → learn various What (definitions, tools) & mainly focus on How (technicalities, tools), a little bit on Why.

## Mathematics

Mathematics: learn & build various What (definitions, concepts), mainly focus on Why (logic, rigorous proof), then on How (mathematical tools)

# Prerequisites



Hình: Foundations & 4 pillars of ML. Source: [DFO23, Fig. 1.1, p. 14].

# Prerequisites

Linear Algebra

Probability

Statistics

# Artificial Neural Networks (ANNs)

