



CS Get-Skilled Academy

Machine Learning

Course Prerequisites

Mostafa S. Ibrahim

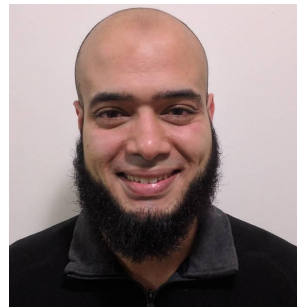
Teaching, Training and Coaching for more than a decade!

Artificial Intelligence & Computer Vision Researcher

PhD from Simon Fraser University - Canada

Bachelor / MSc from Cairo University - Egypt

Ex-(Software Engineer / ICPC World Finalist)



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Python Programming Skills

- You need to be a good coder
- Coding mistakes:
 - Normal coding bugs
 - A scientific mistake leading to wrong calculations
- You should have debugging skills
- You better implemented some 300 lines of code basic projects
- Some topics: read/write files, numpy, basics of classes

Mathematics

- Machine learning involve many mathematical topics
 - Probability
 - Statistics
 - Calculus
 - Linear Algebra
 - Geometry
- The better you are in math, the easier studying machine learning
- Good news: you can count on minimal math and do good progress then expand your math skills later
 - Each topic (depth) requires a specific subset of prerequisites
 - The puzzle: which math topics?!

Minimal Math: Geometry

- Line equation: $y = mc + cx$ (understand the slope: +ve, -ve, steepness)
- Hyperplane: line / plane
- Notes
 - Once the course starts, we need these topics

Calculus

- Find min of quadratic function using differentiation
- Functions: local minima and saddle points
- Derivative Rules (be skilled in **chain rule**)
- Common Derivatives: polynomials, log and exponential
- **Partial derivatives**
- Compute the partial derivatives of these functions relative to x and y :
 - $(2x-4)^5 + 4yx$, $6(2x^3-4)^5 + 4yx$, $\sqrt{4yx}$, $\log(2x^3 + 4yx)$, $\exp(2x^3 + 4yx)$
- Notes: This is a must basics early in the course

Linear Algebra

- Vector and Matrix
 - operations: add, multiply, scalar, **matrix-matrix multiplication**, transpose
- Apply the operations using python Numpy
 - Pronounced: **num-bye** or num-bee

Probability & Statistics

- Conditional probability
- Rules in probability
- Expected value
- Distributions: Bernoulli, Uniform, binomial, exponential, **normal (2D Gaussian)**
- Statistics: mean, median, mode, variance, covariance, standard deviation, percentile

Algorithms

- Graph representation
- Basics of graph traversal
- Basics of DP

Background lectures

- I will **refresh some** of these topics
- My assumption: you know them but refreshing
- Examples
 - Normal Distribution
 - Linear Equation
 - Calculs
 - Graph Representation
- So overall, **don't worry if** you have fair math background sometime ago

Beyond the course

- After the course, it is highly recommended to consider the next 5-years of your life as sharpening more
 - Your mathematical skills
 - Your machine learning background: depth and breadth

Relevant Materials

- Note: I did not try
- Stanford CS229: First 3 [lectures](#) about prerequisites
- [Couseira](#): Mathematics for Machine Learning Specialization
- [Couseira](#): Mathematics for Machine Learning and Data Science Specialization
- [Udemy](#): Mathematical Foundations of Machine Learning
- AnaHr [channel](#)
- Eng Ahmed Fathi: [linear algebra](#)
- My [Udemy](#) courses for Python and Algorithms

“Acquire knowledge and impart it to the people.”

“Seek knowledge from the Cradle to the Grave.”

