

Welcome

We're excited that you're interested in Holberton's Machine Learning Specialization! The following is a list of resources that have been put together to help students get up to speed with the math foundations that will be used in this curriculum. It is highly suggested that you start from the top and work your way down. Starting with **Linear Algebra**, all of the following topics will be refreshed upon throughout the course of the ML specialization. Happy learning!

Precalculus

- Complex numbers: <https://www.khanacademy.org/math/precaculus/x9e81a4f98389efdf:complex>
- Polynomials: <https://www.khanacademy.org/math/precaculus/x9e81a4f98389efdf:polynomials>
- Composing Functions: <https://www.khanacademy.org/math/precaculus/x9e81a4f98389efdf:composite>
- Trigonometry: <https://www.khanacademy.org/math/precaculus/x9e81a4f98389efdf:trig>

Linear Algebra

- Vectors: <https://www.khanacademy.org/math/precaculus/x9e81a4f98389efdf:vectors>
- Matrices: <https://www.khanacademy.org/math/precaculus/x9e81a4f98389efdf:matrices>
- The Essence of Linear Algebra:
https://www.youtube.com/watch?v=fNk_zzaMoSs&list=PLZHQObOWTQDPD3MizzM2xVFItgF8hE_ab
- The Inverse: <https://www.mathsisfun.com/algebra/matrix-inverse-minors-cofactors-adjugate.html>

Calculus

- Sequences and Series: <https://www.khanacademy.org/math/precaculus/x9e81a4f98389efdf:series>
- The Essence of Calculus:
<https://www.youtube.com/playlist?list=PLZHQObOWTQDMsr9K-rj53DwVRMYO3t5Yr>
- Differential Equations: <https://www.youtube.com/playlist?list=PLZHQObOWTQDNPOjrT6KVIfJuKtYTftqH6>
- Multivariable Calculus (up to but excluding Curvature intuition):
<https://www.youtube.com/watch?v=5mMLaK1ByZc&list=PLSQL0a2vh4HC5feHa6Rc5c0wbRTx56nF7&index=34>

Probability

- Statistics and Probability: <https://www.khanacademy.org/math/statistics-probability>
- Multivariate Probability:
 - Joint Probability Distributions:
http://homepage.stat.uiowa.edu/~rdecook/stat2020/notes/ch5_pt1.pdf
 - Multivariate Gaussian distributions: <https://www.youtube.com/watch?v=eho8xH3E6mE>
 - The Multivariate Gaussian Distribution: <http://cs229.stanford.edu/section/gaussians.pdf>
 - An Introduction to Variance, Covariance & Correlation:
<https://www.surveygizmo.com/resources/blog/variance-covariance-correlation/>
- Bayesian Probability:
 - Bayes' Theorem - The Simplest Case: <https://www.youtube.com/watch?v=XQoLVI31ZfQ>
 - A visual guide to Bayesian thinking: https://www.youtube.com/watch?v=BrK7X_XIGB8
 - Base Rates: http://onlinestatbook.com/2/probability/base_rates.html
 - Bayesian statistics: a comprehensive course:
<https://www.youtube.com/playlist?list=PLFDGp5YzjqXQ4oE4w9GVWdiokWB9gEpm>
 - Bayes' rule - an intuitive explanation:
https://www.youtube.com/watch?v=EbyUsf_jUjk&list=PLFDGp5YzjqXQ4oE4w9GVWdiokWB9gEpm&index=14

- Bayes' rule in statistics:
<https://www.youtube.com/watch?v=i567qvWejJA&list=PLFDbGp5YzjqXQ4oE4w9GVWdioKWB9gEpm&index=15>
- Bayes' rule in inference - likelihood:
https://www.youtube.com/watch?v=c69a_vIMRQU&list=PLFDbGp5YzjqXQ4oE4w9GVWdioKWB9gEpm&index=16
- Bayes' rule in inference - the prior and denominator:
<https://www.youtube.com/watch?v=a5QDDZLGsXY&list=PLFDbGp5YzjqXQ4oE4w9GVWdioKWB9gEpm&index=17>
- Bayes' rule denominator - discrete and continuous:
<https://www.youtube.com/watch?v=QFzeLh6l9Tg&list=PLFDbGp5YzjqXQ4oE4w9GVWdioKWB9gEpm&index=24>
- Bayes' rule - why likelihood is not a probability:
<https://www.youtube.com/watch?v=sm60vapz2jQ&list=PLFDbGp5YzjqXQ4oE4w9GVWdioKWB9gEpm&index=25>