How to start:

Start small with python and pandas, read `Python for Data Analysis` by Wes McKinney. You can find datasets at https://www.kaggle.com/datasets (you can also challenge your knowledge at Kaggle). If you are ready to go big(data) try Apache Spark out.

In machine learning start with basic models like linear regression and k-means. Understand what gradient descent is and learn feature engineering (transformation on data). Slowly move to more advanced topics like decision trees or SVM. Keep neural networks for a dessert.

Python:

If you want to become a data engineer or machine learning engineer you will need to deal with python at some point. There are other great languages that thrive in the world of data processing like R or Scala, but Python seems to be permeating through the whole industry.

SQL:

It is certain that there is a lot of SQL in data engineering domain, so it is a great to master it as soon as possible. You may want to read and do some exercises from `Head First SQL` by Lynn Beighley if SQL is something new to you. The book was written in 2007, but SQL is so mature it changes slowly. Bear in mind this book only scratches the surface of what is possible with SQL.

PyData stack:

If you are more into machine learning you may want to focus on tools from Python data stack. They are basic, but essential, in everyday work. Learn numpy for efficient data processing in a vectorized way. Learn scikit-learn - it provides a basic yet rich set of operations on data and machine learning models. Learn some visualization tool, like ggplot2 or matplotlib, sometimes the best insights about data can be derived by visual inspection.

Go Cloud:
Experience with one of the most popular cloud providers is a great benefit - learn Amazon Web Services, Google Cloud Platform or Azure.
- AWS offers free account for 12 months at https://aws.amazon.com/free/. You can play with one of the most popular services.
- If you prefer GCP, free account can be also created at https://cloud.google.com/free/. In addition you are getting 300$ to be used.
- If you want to learn Azure, free account can be created at https://azure.microsoft.com/en-us/free/search. They offer 200$ to be used.

There is a lot of materials in the Internet, YouTube. AWS streams some events/presentations at Twitch Platform.

Books:

If you want to become proficient BigData processing start with `Hadoop: The definitive guide` and `Learning Spark`. These two books should get you up and running with distributed data processing.

If you want to learn something more about machine learning read `Python Machine Learning` by Sebastian Raschka and Vahid Mirjalili. For more advanced users `Deep Learning with Python` by François Chollet might be a better option. You do not need to go with Python always (although it seems to be dominating the landscape now) and learn machine learning with `Elements of Statistical Learning` and `Deep Learning`