**1. Basics:**

* Random variables:  
  - Overview [[video](https://www.youtube.com/watch?v=rifK8BtHaYI&list=PLAshlHpA2Iwc10-3HIioqUtqG0Fc4MNpp&index=25&t=0s) - 12 min] and [[article](https://www.investopedia.com/terms/r/random-variable.asp)].  
   - In the context of a dataset [[video](https://www.youtube.com/watch?v=Mjif8PTgzUs&list=PLkIselvEzpM6pZ76FD3NoCvvgkj_p-dE8) - 4 min].
* Cumulative Distribution Functions and Probability Density Functions:  
  - Clearly explained [[video](https://www.youtube.com/watch?v=YXLVjCKVP7U) - 16 min] and [[article](https://towardsdatascience.com/probability-concepts-explained-probability-distributions-introduction-part-3-4a5db81858dc)].

**2. Descriptive Statistics:**

* Statistics, their point estimations with properties (skewness, kurtosis, shape) in the [[video](https://www.youtube.com/watch?v=QoQbR4lVLrs) - 13 min] and [[article](https://towardsdatascience.com/understanding-descriptive-statistics-c9c2b0641291)].
* Degrees of freedom: [[article](https://statisticsbyjim.com/hypothesis-testing/degrees-freedom-statistics/) - also includes explanation in the context of **6. Hypothesis Testing**];
* Interval estimations or confidence intervals:
  + For known Standard Deviation in [[video](https://www.youtube.com/watch?v=9GtaIHFuEZU) - start at 9:44];
  + For unknown Standard Deviation + Student's T-distribution in [[video](https://www.youtube.com/watch?v=BQ88ni4bJNA) - start at 6:15] ;
  + For both [[post](http://www.stat.yale.edu/Courses/1997-98/101/confint.htm)].
* Robust estimations, an overview [[post](https://www.thoughtco.com/what-is-robustness-in-statistics-3126323#:~:text=Robust%20statistics%2C%20therefore%2C%20are%20any,to%20errors%20in%20the%20results.)].
* Maximum likelihood method explained: [[video](https://www.youtube.com/watch?v=XepXtl9YKwc) - 6 min] and [[video](https://www.youtube.com/watch?v=pYxNSUDSFH4) - 5 min]; how to estimate model's parameters with MLM [[article](https://towardsdatascience.com/probability-concepts-explained-maximum-likelihood-estimation-c7b4342fdbb1)].

**3. Sampling methods:**

* All methods explained in the [article](https://towardsdatascience.com/sampling-techniques-a4e34111d808) (an overview).
* A presentation for Stratified Sampling with examples of statistic estimation, properties of different approaches and so on: [slides](https://drive.google.com/file/d/1Eaa2XbiMBtlJfHrZETOPfip2V6DeYPiu/view?usp=sharing) (15 slides).

**4. Hypothesis testing:**

* Basics of HT: null hypothesis - H0, alternative hypothesis - H1, significance level in [[video](https://www.youtube.com/watch?v=VK-rnA3-41c) - 22 min];
* P-values clearly explained in [[article](https://blog.minitab.com/blog/adventures-in-statistics-2/how-to-correctly-interpret-p-values)], how to estimate it for 1-tailed tests [[video](https://www.youtube.com/watch?v=KLnGOL_AUgA) - 22 min] and 2-tailed tests [[video](https://www.youtube.com/watch?v=8Aw45HN5lnA) - only to 12 min];
* Type 1 and 2 errors [[video](https://www.youtube.com/watch?v=9yQm9F2_yIk) - 11 min] and [[article](https://statisticsbyjim.com/hypothesis-testing/types-errors-hypothesis-testing/)];
* Also H0, H1, p-value, types of errors in [[article](https://statisticsbyjim.com/hypothesis-testing/types-errors-hypothesis-testing/)];
* How to check *normality* of a distribution:
  + Shapiro-Wilk, Kolmogorov-Smirnov, Lilliefors tests, QQ-plots: [[article](https://towardsdatascience.com/6-ways-to-test-for-a-normal-distribution-which-one-to-use-9dcf47d8fa93) - points 3-6; histogram and boxplots are not valid as normality checking approaches];
  + D’Agostino’s K2, Anderson-Darling tests and python API's: [[article](https://machinelearningmastery.com/a-gentle-introduction-to-normality-tests-in-python/)];
  + QQ-plots clearly explained in the [[video](https://www.youtube.com/watch?v=okjYjClSjOg) - 7 min];
* How to check *mean equality* of 2 distributions *(pay attention to the test assumptions!)*:
  + T-test and Paired T-test: [[article](https://www.statisticshowto.com/probability-and-statistics/t-test/)], [[Python API](https://docs.scipy.org/doc/scipy/reference/generated/scipy.stats.ttest_ind.html)];
  + Welch T-test: [[article](https://www.statisticshowto.com/welchs-test-for-unequal-variances/)], [[Python API](https://docs.scipy.org/doc/scipy/reference/generated/scipy.stats.ttest_ind.html) - the same link, use parameter *equal\_var*];
  + 2- and 1-Tailed T-test [[video](https://www.youtube.com/watch?v=zJ8e_wAWUzE) - 13 min].

**Additional:**

* ANOVA - mean equality test for 3 and more distributions:
  + 1-Way ANOVA [[video](https://www.youtube.com/watch?v=-yQb_ZJnFXw) - 14 min];
  + 2-Way ANOVA [[video](https://www.youtube.com/watch?v=cNIIn9bConY&t=164s) - 18 min];
  + These are described in [[article](https://www.analyticsvidhya.com/blog/2020/06/introduction-anova-statistics-data-science-covid-python/)].
  + Post hoc analysis of the ANOVA results:
    - Bonferroni correction [[video](https://stepik.org/lesson/8085/step/1?unit=1364) - 10 min] and [[pdf](https://www.stat.berkeley.edu/~mgoldman/Section0402.pdf) - points 1-2];
    - Tukey's test (correction) [[article](https://www.statisticshowto.com/tukey-test-honest-significant-difference/)];
* Chi2 test:
  + For independence of *categorical* variables hypothesis [[article](https://machinelearningmastery.com/chi-squared-test-for-machine-learning/#:~:text=The%20Pearson's%20chi%2Dsquared%20test%20for%20independence%20can%20be%20calculated,for%20the%20two%20categorical%20variables.)].