
Fundamental Bio-Medical Statistics

1. **What is statistics, how to make sense of it**
Problems, Variables and (maybe) answers
2. **Populations and Samples, size and representativeness**
Looking at the sample: identifying outliers and/or mistakes
Cleaning a sample and deciding what to do with “weird cases”
3. **Sample analysis**
Distribution
Average
Standard deviation and variance
Confidence intervals
Normal Distribution and other distributions
One or two tailed
How to read a normal distribution
Standardised variables – why?
4. **Exploring data with visuals – reading and plotting**
Histograms / Boxplots / Bar charts/ Line charts / Pies/ Scatterplots
5. **From sample to population**
Hypothesis
Errors – type I and type II
Preparing to test
6. **Assumptions**
Parametric data
Normality
Testing for normality
Testing for homogeneity of variance
Correcting problems
7. **Comparing Means**
The T-Test
The T-test as a general linear model
What if my data is not normally distributed?
Wilcoxon Test / Mann-Whitney Test
8. **ANOVA**
Theory behind ANOVA
What it is used for
The F-Ratio
Calculating the effect size
Making sense of the results

9. Introduction to Correlations

- Correlation coefficient and standardization
- Confidence intervals for r
- Pearson correlation
- Spearman's Correlation
- Kendall's Tau (non-parametric)
- Coefficients and how to report them

10. Linear Regressions

- Straight lines
- The method of the least squares
- Goodness of fit
- Individual predictors
- Interpreting a linear regression
- Overall fit
- Model parameters

11. Multiple Regression

- From single variables to multiple variables
- Methods of regression
- How accurate is the model – diagnostics and generalization
- Assumptions – multicollinearity
- Interpreting multiple regressions and how to report
- ANOVA as a regression / T-test
- Dummies in multiple regressions how to interpret

12. Categorical Variables

- Pearson Chi-Square
- Odd ratios

13. Logistic Regression – an introduction

- The principles behind logistic regression
- Assumptions and when things go wrong
- Methods of logistic regression
- Interpreting logistic regressions
- How to report
- Predictive models of event