Module 1 – introduction into statistics

Decision making

1. Science based decision making – critical, but its role is bounded
2. Consensus based decision making – agreement is made with a panel
3. Economic and multi criteria analysis – often a cost-benefit analysis

In this subject we will try to cover the role of statistics in decision making in **scientific research** focusing on the **biotechnology industry**.

e.g. Drug development is very expensive → need technology transfer among Uni/investors/small biotech companies → for these transfer to happen, need statistical evidence that the product will be viable

→ **You cannot prove anything with statistics. But it can be disproved**

Some useful terms

Independent variable – the value we controlled in the experiment

Dependent variable – the value not controlled and is to be measured

Measurement error ε – e.g. the response time when you are measuring time

Replicates – multiple observations

Random variation – the different results from repetitions of an experiment under identical conditions

Model parameter – symbol you used to represent the number for assumed model. E.g. A straight line would be $y = \alpha+\beta x$, the α and β here are model parameters.

Estimates – different samples received under identical conditions will lead to different estimates of α and β (**parameter estimates**). Because these estimates may change from sample to sample, we called them **random variables**

Confidence interval – e.g. 95% CI indicated that there are 95% probability containing the true value

Hypothesis testing – suppose a parameter takes a particular value and use test to find out is this true