



# **Introduction – Stat 1000**

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# Introduction

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- Instructor
- Students



# Introduction

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- Syllabus
- Web page
- Class structure and expectations



# Data Collection

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# What is Statistics?

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# What is Statistics?

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Statistical techniques are being used in many aspects of our life.

- Surveys for elections, consumer reports, product satisfaction etc
- The effects of drugs
- Product quality
- Econometrics
- Sport



# What is Statistics?

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- Definition?



# What is Statistics?

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- Statistics (Dictionary.com) – The mathematics of the collection, organization and interpretation of numerical data, especially the analysis of population characteristics by inference from sampling.





# What is Statistics?

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- There are many different definitions for statistics. Certain concepts appear in most definitions: variation, uncertainty, inference, science.
- In our daily life there are many examples for the use of Statistics:



# What is Statistics?

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- Parents of a child with a genetic defect consider having another child. They will base their decision on the chance that the next child will have the same defect.



# What is Statistics?

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- To choose the best therapy, a doctor must choose between several possibilities.



# What is Statistics?

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- In an experiment to investigate whether a food additive is carcinogenic (enhances the chance for cancer), the USDA has animals treated with and without the additive.



# What is Statistics?

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- In designing and planning medical care facilities, there is a need to take into account changing needs of medical care.



# Basic concepts

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- **Population:** The entire collection of subjects/items under investigation.
  - The number of subjects/items in the population is called the size of the population.



# Basic concepts

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- **A population parameter:** is a numerical quantity that describes a characteristic of a population.
  - The true value of a population parameter can be known if and only if the outcome for every subject/item in the population is recorded.
  - The population parameter is considered to be an unknown constant.
  - The goal is to estimate population parameter value.



# Basic concepts

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- **A sample:** is a subset of the population selected for study in order to gain more information about the entire population.
  - The number of subjects/items in the sample is called the sample size.
  - Information collected on a sample is used to draw conclusions about the population parameter.
  - It is crucial that the sample will resemble the population





# Data Collection

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- For any type of research
  - First specify the objective of the study (Main question)
  - Define the population in mind and parameters of interest
  - What are the variables that will be collected?
  - What is the study design?
  - Data collection
  - Data analysis
  - Inference



# Assumptions

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# Assumptions and expectations in every day life

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- We make assumptions all the time
- Our life (many times) depend on these assumptions
  - crossing a street
  - sitting on a chair
  - cell phone
- We need to be aware of our assumptions



# Science and measurement

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# Science and measurement

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- Gravity
- Crops