

# Stat 250: Stat Principles and Practices

## Sampling Distributions

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## Terminology

Ex: Interest lies in average height of S250 students.

- *population*: all S250 students
- *parameter*: pop. mean height,  $\mu$
- *sample*: 100 students chosen
- *statistic*: sample mean height,  $\bar{x}$

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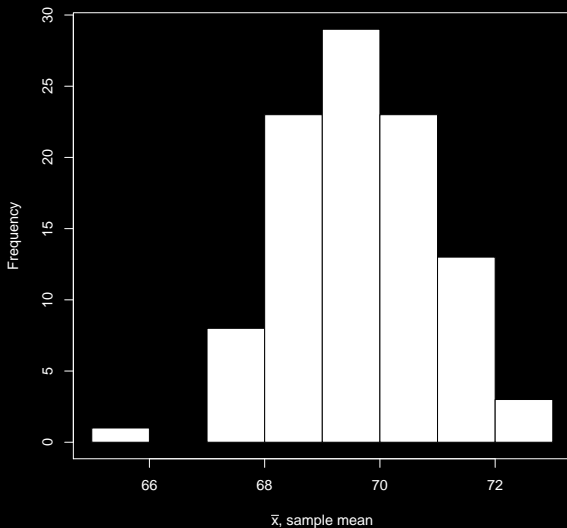
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*random sample*: each observation has same chance of being selected from the population.

## Sampling Distribution

The *sampling distribution* of a sample statistic from a sample of size  $n$  is the probability distribution of the sample statistic.

# Heights of S250 students, $n = 2$



# Normal Sampling Distributions

	Population	Sampling distr
mean	$\mu$	$\mu_{\bar{X}}$
variance	$\sigma^2$	$\sigma_{\bar{X}}^2$
	$X \sim N(\mu, \sigma)$	$\bar{X} \sim N(\mu, \sigma/\sqrt{n})$
	$X \sim (\mu, \sigma)$	$\bar{X} \sim AN(\mu, \sigma/\sqrt{n})$

## Central Limit Theorem

If we obtain a random sample of size  $n$  from a population with mean  $\mu$  and variance  $\sigma^2$ , then for sufficiently large  $n$  the sampling distribution is approximately normal:

$$AN \left( \mu, \frac{\sigma}{\sqrt{n}} \right).$$