

# Chapter 6: Discrete Probability Distributions

- 6.1 Discrete Random Variables
- 6.2 The Binomial Probability Distribution
- 6.3 The Poisson Probability Distribution

# Discrete Random Variables

Consider the probability experiment of flipping a coin two times. The possible outcomes of this experiment, the sample space, is:

$$S = \{HH, HT, TH, TT\}$$

Where H is a "head" and T is a "tail." We call the outcome of such an experiment a **random event** since we are never sure of its value.

Mathematicians and statisticians like to work with numbers or things that can be represented by numbers. For this reason, we try to assign the random event a number or a set of numbers.

# Random Variable

**Definition:** A random variable is a numerical measure or representation of a random event in a probability experiment.

**Remark:** Since a random variable comes from something that is random (a random event), it may take several numerical values. We will denote the random variable by using capital letters, e.g.,  $X$ , its values by small letter variables, e.g.,  $x$ .

**Example:** Flipping a coin twice.  $S = \{HH, HT, TH, TT\}$ . Let  $X$  be the random variable that represents the number of tails. Then the number of values assume by  $X$  are:  $x = 0, 1, 2$ .