

Section 5.3 - Poisson Distributions

The Poisson distribution is another common discrete probability distribution. This distribution is often used for describing behavior such as radioactive decay and patients arriving at an ER.

The **Poisson distribution** is a discrete probability distribution that applies to occurrences of some event over a specified interval (of time, distance, etc). The random variable x is the number of occurrences of the event in the interval. The probability of the random variable x is given by

$$P(x) = \frac{\mu^x \cdot e^{-\mu}}{x!},$$

where μ is the mean number of occurrences in the interval.

Requirements for the Poisson Distribution

1. The random variable x is the number of occurrences of an event over some interval.
2. The occurrences must be random.
3. The occurrences must be independent of each other.
4. The occurrences must be uniformly distributed over the interval.

In a Poisson distribution,

- mean = μ
- $\sigma^2 = \mu$
- $\sigma = \sqrt{\mu}$