

## Enduring understanding

The following are the four ideas that I hope will persist with students after the minutia of the Poisson distribution has faded from memory.

1. Probability is a framework for organizing beliefs; it is not a statement of what your beliefs should be.
2. Probability is a framework for coherently updating beliefs based on new information and data.
3. Probability models are a powerful framework for describing and simplifying real world phenomena as a means of answering research questions.
4. Probability models can be expressed and applied mathematically and computationally.

## Learning outcomes

The learning outcomes are listed below with course topics listed to the right.

1. Probability is a framework for organizing beliefs; it is not a statement of what your beliefs should be.

Student will ...

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| <ul style="list-style-type: none"><li>(a) compare and contrast different definitions of probability, illustrating differences with simple examples</li><li>(b) verbally express the rules of probability.</li><li>(c) mathematically express the rules of probability.</li><li>(d) computationally express the rules of probability.</li><li>(e) illustrate the rules of probability with examples.</li><li>(f) using the long-run proportion definition of probability, derive the univariate rules of probability.</li><li>(g) organize/express bivariate random variables in cross tables.</li><li>(h) define joint, conditional, and marginal probabilities.</li><li>(i) identify J, C, and M probabilities in cross tables.</li><li>(j) identify when a research question calls for a J, C, or M probability.</li><li>(k) describe the connection between conditional probabilities and prediction.</li><li>(l) derive Bayes rule from cross tables.</li><li>(m) apply Bayes rules to answer research questions.</li><li>(n) determine if joint outcomes are independent.</li><li>(o) calculate a measure of association between joint outcomes.</li></ul> | <ul style="list-style-type: none"><li>• long-run proportion</li><li>• personal beliefs</li><li>• combination of beliefs and data</li></ul> |
|---|--|
2. Probability is a framework for coherently **updating** beliefs based on new information and data.
  3. Probability models are a powerful framework for describing and simplifying real world phenomena as a means of answering research questions.
  4. Probability models can be expressed and applied mathematically and computationally.