PART I: Theory

1. Total probability theorem.

2. Bayes’ rule.
   - Example with binary symmetric channel.

PART II: Matlab presentation

1. Quick review of basic ideas.
   - Easy matrix manipulations.
   - Solving a system with Matlab.

2. Uniform and Gaussian distributions and their histograms.
   - Usage of \texttt{rand()} and \texttt{randn()} functions.
   - Usage of \texttt{hist()} function to get the histogram.
   - Attention: The histogram looks like the expected distribution after a large enough number of random numbers.
   - Histogram resolution tradeoff: Increasing the number of bins of the histogram gives you better resolution, but makes curve look more “noisy”.

3. Simulation of a simple random experiment: Tossing a coin.
   - Syntax to create a \textit{function} in Matlab.
   - Use \texttt{rand()}. Quantize properly (use the correct thresholds) to get the correct probabilities for the elementary outcomes.
4. Summation of (uniform) distributions.

- For loop in Matlab.
- Summation of a large number of similar probability distributions leads to the “bell curve” or Gaussian distribution.