# Table of Contents

**Preface**

**Part I: Fundamentals**
- Introduction
- Tutorial

**Part II: Data Collection with Matlab**
- Visual Search and Pop Out
- Attention
- Psychophysics
- Signal Detection Theory

**Part III: Data Analysis with Matlab**
- Frequency Analysis Part I
- Frequency Analysis Part II: Non-stationary Signals and Spectrograms
- Wavelets
- Convolution
- Introduction to Phase Plane Analysis
- Exploring the Fitzhugh-Nagumo Model
- Neural Data Analysis: Encoding
- Principal Components Analysis
- Information Theory
- Neural Decoding: Discrete variables
- Neural Decoding: Continuous variables
- Functional Magnetic Imaging

**Part IV: Data Modeling with Matlab**
- Voltage-Gated Ion Channels
- Models of a Single Neuron
- Models of the Retina
- Simplified Models of Spiking Neurons
- Fitzhugh-Nagumo Model: Traveling Waves
- Decision Theory
- Markov Model
- Modeling Spike Trains as a Poisson Process
- Synaptic Transmission
- Neural Networks: Unsupervised learning
- Neural Network: Supervised Learning

**Appendices**
- Appendix 1: Thinking in Matlab
- Appendix 2: Linear Algebra Review