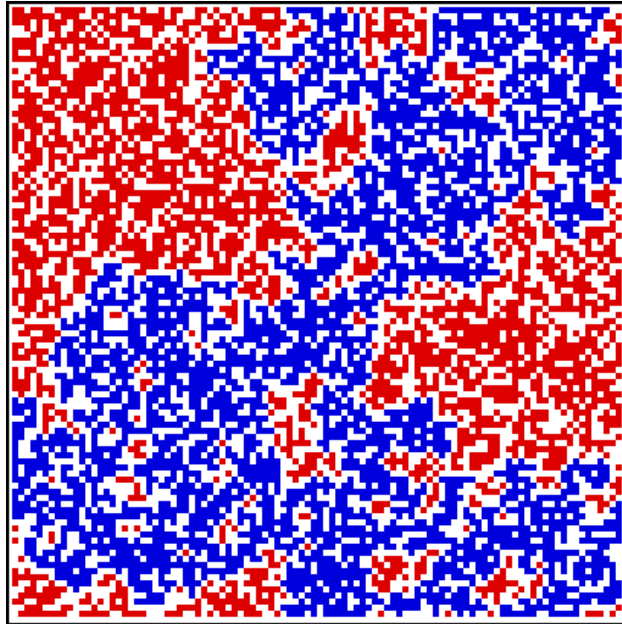# Introduction to Probability and Inference

1 Administrative Information

- **Instructor:** Prof. Eilyan Bitar, 326 Rhodes Hall, (eyb5@cornell.edu)

- **Teaching Assistants:**
  - Kia Khezeli, (kk839@cornell.edu)
  - Kursat Mestav, (krm264@cornell.edu)
  - Patrick Wang, (pw349@cornell.edu)

- **Lectures:** MWF (1:25 - 2:15 PM) in B14 Hollister.

- **Discussions:**
  - Section 201: Tuesday (10:10 - 11:25 AM) in 203 Phillips
  - Section 202: Tuesday (1:25 - 2:40 PM) in 219 Phillips

- **Office Hours:**
  - Kia Khezeli: Wednesday (5:00 - 6:00 PM) in 312 Rhodes Hall
  - Kursat Mestav: Thursday (4:30 - 5:30 PM) in 310 Rhodes Hall
  - Eilyan Bitar: Friday (2:30 - 4:00 PM) in 326 Rhodes Hall

- **Course Website:** Blackboard

2   Course Information

- **Textbook:** Dimitris P. Bertsekas and John N. Tsitsiklis, `Introduction to Probability`, 2nd Edition, Athena Scientific, 2008.

- **Course Outline:** (subject to change)

  1. Probability Models and Discrete Random Variables (RVs)
     - Probability Models and Axioms
     - Conditioning and Bayes' Rule
     - Independence
     - Counting
     - Discrete RVs: Probability Mass Functions (PMFs), Expectation, Variance
     - Multiple Discrete RVs
  2. General RVs
     - Continuous RVs: Probability Density Functions (PDFs), Expectation, Variance
     - Cumulative Distribution Functions (CDFs)
     - Multiple Continuous RVs
     - Conditioning, Bayes' Rule, and Derived Distributions
     - Normal RVs
  3. Limit Theorems
     - Markov, Chebyshev, and Chernoff Inequalities
     - Weak Law of Large Numbers
     - Central Limit Theorem
     - Monte Carlo Methods ($\star$)
  4. Bayesian Statistical Inference
     - Point Estimation
     - Minimum Mean Squares Estimation
     - Linear Minimum Mean Squares Estimation
  5. Random Processes
     - Bernoulli and Poisson Processes ($\star$)
     - Discrete-time Markov Chains ($\star$)

  ($\star$) = selected topics.

3   Grading/Homework/Exams

- **Course Grading:**
  - Homework (15%, lowest HW score dropped)
  - Prelim 1 (22.5%)
  - Prelim 2 (22.5%)
  - Final Exam (40%)

- **Homeworks:**
  - Homework assignments, solutions, and general announcements will be posted on Blackboard.
  - Weekly homeworks will be assigned every Monday, and must be submitted by **5 PM the following Monday** in the black HW dropbox labeled "ECE 3100 Spring 2018" (in front of 237 Phillips).
  - The homework with the lowest score will be automatically dropped.
  - **No late submission of homework will be accepted.** If you don't submit your homework by the deadline, you are giving yourself a zero on that assignment.
  - Any homework that is difficult to read will receive a score of zero.
  - **Collaboration:** Every student attending this course is expected to abide by the Cornell University Code of Academic Integrity described in Section 4.

- **Exam Schedule:**
  - Prelim 1: TBD
  - Prelim 2: TBD
  - Final: Monday, May 21, 2:00 PM

4   Collaboration and Code of Conduct

Every student attending this course is expected to abide by the Cornell University Code of Academic Integrity, which can be found at: `http://cuinfo.cornell.edu/aic.cfm`. Any piece of work you turn in for credit must be your own work. Discussion with other students about specific homework problems is permitted to the extent that discussion is limited to problem approach and does not include note taking. In writing up your homework solution, you must acknowledge anyone with whom you collaborated. If you use papers or books or other sources (e.g. material from the web) to help obtain your solution, you must cite those sources. You may not discuss exam problems with other students. Please ask if you are unclear as to what constitutes excessive collaboration.

5   Misc

The Prelims will take place in the evening to provide students with ample test time. To compensate students for the additional time commitment outside of normal class hours, one lecture will be canceled.