

Math 339SP, Spring 2024 — Project assignment 0

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Due April 2 at 5:00 pm

Instructions. This prompt covers material in preparation for our class project. Our end of semester project is coming up and I'd like us to start thinking about it. The goal of the project will be for you to communicate about a topic on stochastic processes that hasn't been discussed in class. You'll work in small groups and give a 15-20 minute presentation. The presentation can be an expository summary of the topic, though I am open to other ideas like a demo of a simulation, for example. I have some suggested papers listed below which can serve as a primary source for your presentation, though you should feel free to find other resources. I am also open to other topic suggestions if you find something not covered here.

Problem 1. As your submission for this assignment, please do the following.

1. Skim through the papers below, and, if you'd like, do a search for other papers or topics. Give me a ranking of your top 3 preferred topics. Feel free to give justification of your preferences or just give a list.
2. Tell me if you have someone you'd like to work with and whether you've discussed whether you have shared preferences. It's ok if you don't have someone to work with. I will try to pair you with others who share topic preferences.

Here is the list of some suggested topics, each with a corresponding paper that can be used as a primary source. A copy of each paper is posted [on Moodle](#). Please note that most papers have more ideas than you'll have time to present on. It's ok to only focus on part of a paper in your presentation. Also, you might find other papers on the same topic. These just represent some of the first ones that I found.

- Markov Chains and Music: *Markov Chains for Computer Music Generation* by Ilana Shapiro and Mark Huber
- Markov Chains and Mixed Martial Arts: *A Markov chain model for forecasting results of mixed martial arts contests* by Benjamin Holmes, Ian G. McHal, and Kamila Źychaluk
- Markov Chains and Card Shuffling: *Shuffling Cards and Stopping Times* by David Aldous and Persi Diaconis
- Stochastic Epidemic Models: *A primer on stochastic epidemic models: Formulation, numerical simulation, and analysis* by Linda J.S. Allen
- Markov Chain Monte Carlo and Ecology: *An Application of Markov Chain Monte Carlo to Community Ecology* by George W. Cobb and Yung-Pin Chen
- Markov Chain Monte Carlo and Scheduling: *Traveling Baseball Players' Problem in Korea* by Hyang Min Jeong, Sang-Woo Kim, Aaram J. Kim, Younguk Choi, Jonghyoun Eun, and Beom Jun Kim
- Branching processes: *On Caterpillars, Trees, and Stochastic Processes* by John C. Turner
- Generalizations of the Random Walk: *On Random Walks with Geometric Lifetimes* by Elcio Lebensztajn and Vincenzo Pereira
- Markov Chains and Mixing: *A real-world Markov chain arising in recreational volleyball* by David Aldous and Madelyn Cruz

- Markov Chains and Badminton: *Using Markov chains to identify player's performance in badminton* by Javier Galeano, Miguel-Ángel Gómez, Fernando Rivas, and Javier M. Buldú