

## Term Project

### Deadlines

- **Bid for your preferred topic/date is due 7:20 pm, Tuesday, October 27**
- **Reading materials for the class and quiz questions with solution is due one week before your presentation**
- **Power Point Presentation is due 24 hours before your presentation**

### Grading

The Term Project weights 40% of the overall grade: 15% for the reading materials and quiz questions you prepare for the class, and 25% for your presentation. The reading materials and presentation will be graded by the instructor and the entire class, while the quiz questions you prepare will be graded by the instructor.

### Topics of Choice

Topics include the applications and the materials the instructor will not have time to cover extensively in class. Please see the power point presentation given by the instructor for details.

### Team Work

A team has two members. You can choose your partner (preferred) or be matched by the bids.

### Presentation

The length of presentation is 35 ~ 45 minutes. Please use power point to make your presentation, which is due 24 hours before your presentation. Please feel free to use the board during your presentation. While it is useful to highlight some critical derivations, it is a bad idea to spend the majority of time on math derivation. The presentation will be graded by the instructor and the class. All students are required to read the paper before presentation and so will be able to ask good in-depth questions at the presentation.

## **Reading Materials**

You have to prepare some reading materials for the class to read before your presentation. It can be a paper, report, your own writing, or their combinations. Please email the reading materials to the instructor at least one week before your presentation. Then the instructor will distribute them to the class. All students are required to read them before presentation and so will be able to ask good in-depth questions at the presentation.

## **Quiz**

After presentations, a quiz will be given. The quiz questions are provided by the presenters. For each topic, the presenters have to submit three quiz questions with solution at the same time when submitting the reading materials. The quiz questions should not be too easy or too hard. Ideally, they can be answered easily if students spend time reading the materials. The quality of quiz questions will be graded by the instructor.

## **Bid for Topic and Presentation Date**

Please use the following form to choose the method you want to investigate and the date of your presentation. You have to turn in this bidding form by October 27. Failing to do so, you will be assumed that you are completely flexible and will be assigned a method/date which is left.

A team has to submit a single form of bidding. If you have not found a team partner, you submit your own bid and your partner will be assigned based on the match of bids.

You have a total of 100 points to bid for your preferred topic/date. If you have found your partner, a team submits a single bid. However, the total is increased to 101 points.

Each bid can place two “absolutely No”s for topic/date without using any point.

When two bids are the same, a winner will be randomly chosen. However, if one of the bidder is the person who proposed the topic, she/he has higher priority when there is a tie.

## Names:

Presentation Topic/Date Alternatives	Your Bid ( $\geq 0$ ) <sup>1</sup>	No <sup>2</sup>
Topic A. Poisson Process Applications		
Topic B. Markov Chain Application 1		
Topic C. Markov Chain Application 2		
Topic D. MC Model of Section 8 Rent Burden		
Topic E. Markov Chain Monte Carlo		
Topic F. Sections 7.3 & 7.4		
Topic G. Section 7.5 & 7.6		
Topic H. Section 7.10		
Topic I. Sections 10.3 and 10.4		
Topic J. Application of Brownian Motion		
Topic K. Simulation of Brownian motion		
Presentation on 11/17		
Presentation on 11/24		
Presentation on 12/1		
Presentation on 12/8		
Total points of your bids (should be $\leq 100$ or $101$ ) <sup>1</sup>		

1. In the 2nd column, please place your bids based on your preference on the topics and dates. The higher bid you place, the higher chance you will get them. The total bid is 100 points if submitted by a single person, and 101 points if submitted by a team of two persons.
2. In the 3rd column of No list, you can choose up to 2 item (topic/date) that you absolutely don't want. For example, you can use this to avoid the conflicting date for presentation.

# List of Project Topics for 645 Class

# Poisson Processes

## A. Applications

- Examples 5.18, 5.19, 5.20, 5.21, 5.22, 5.24
- Section 5.3.6

# Markov Chain (1)

## B. Applications 1

- Internet applications & computer science
- Economics and finance

## C. Applications 2

- Social sciences
- Mathematical biology
- Gambling
- Music
- Baseball
- Markov text generators

Please visit the following for more about applications

- [http://en.wikipedia.org/wiki/Markov\\_chain](http://en.wikipedia.org/wiki/Markov_chain)

# Markov Chain (2)

## D. Markov Chain Model of Section 8 Rent Burden

- Proposed by Brent Mast

## E. Markov Chain Monte Carlo

- Simulation for Markov Chains
- Methods
- Strengths and weaknesses
- Applications
- Available tools

# Renewal Theory

## F. Sections 7.3 & 7.4

- 7.3 Limit theorems and their applications
- 7.4 Renewal reward processes

## G. Section 7.5 & 7.6

- 7.5 Regenerative processes
- 7.6 Semi-Markov processes

## H. Section 7.10

- Insurance ruin problem
- Proposed by Blane Laubis

# Brownian Motion

- I. Sections 10.3 and 10.4
  - 10.3 Geometric Brownian Motion
  - 10.4 Pricing stock options
    - Black-Scholes Formula
- J. Application of Brownian Motion
  - Finance & stock market
  - Physics
- K. Simulation of Brownian motion
  - Methods
  - Strengths and weaknesses
  - Applications
  - Available tools