

# CSC2206 - System Modeling and Analysis

Peter Marbach

[www.cs.toronto.edu/~marbach/csc2206\\_S10.html](http://www.cs.toronto.edu/~marbach/csc2206_S10.html)

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## Motivation

### Goal

- Make you stronger researchers by providing tools to model systems with uncertainty.

### Application Areas

- Machine Learning
- Financial Mathematics
- Systems
  - Database Systems
  - Computer Systems
  - Computer Networks

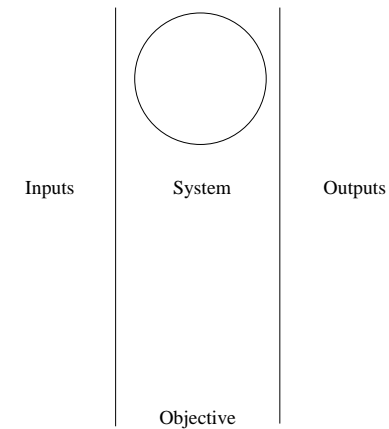
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## System Modeling and Analysis

- Motivation
- Overview
- Course Organization

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## Motivation



## Design

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- Heuristic
- Simulations
- Mathematical Modeling and Analysis

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## Motivation

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### Questions

- Performance of a Given System?
- Performance Change as Systems Changes
- Choose between different Designs
- Optimal Design

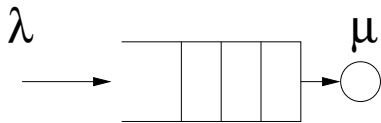
### Approach

- Mathematical Representation/Model
  
- Analysis

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## Example: Single Buffer

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## Motivation

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### Why Difficult?

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## Motivation

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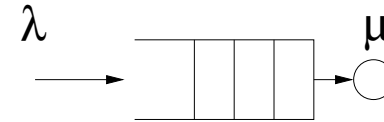
### Goal

- Know Probabilistic Models
- Know when and how to apply them
- Become Stronger Researchers

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## Example

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## Outline

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- Review Probability Theory
  - Poisson Processes
  - Renewal Processes
  - Markov Chains
  - Markov Processes
  - Markov Reward Processes
  - Dynamic Programming
- > **Quality not Quantity**  
– > **Fundamentals not Applications**

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## Organization

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- Lectures
  - Concepts
- Assignments
  - Study and Practice

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## How to be Successful

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- Be Motivated
- Study in Groups
- Keep up with Reading/Material
- Spend Time on Assignments

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## Grading

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- 5 Assignments: 15%
- Midterm: 30%
- Final: 55%

Each student has to submit (in Latex and pdf-file) the solutions for one of the assignments.

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## Course Material

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- Text Book:
  - "Discrete Stochastic Processes," R. Gallager.
- Reference:
  - "Stochastic Processes," S. Ross
- Lecture Slides

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## Information

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Email by Friday

- Name and Student ID

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## Course Web Page

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- Schedule
- Assignments
- Lecture Slides
- Reading Assignments