Stochastic Processes

MH 3512

Introduction

This lecture

Background

- **Since 09.2025:** Tenured Associate Professor at NTU
- **01.2019-08.2024:** Nanyang Assistant Professor at NTU
- **06.2015-12.2018:** Postdoc in Financial and Insurance Mathematics at ETH Zurich
- **02.2012-05.2015:** PhD in Mathematics, ETH Zurich (Columbia U.)

  Supervisors: Prof. Marcel Nutz (Columbia University), Prof. Martin Schweizer (ETH Zurich)

  Thesis title: Knightian Uncertainty in Mathematical Finance
- **10.2006-10.2011:** Bachelor and Master in Mathematics at ETH

Research interests:

- Machine Learning Algorithms in Finance and Insurance
- Model Uncertainty in Financial Markets and Operations Research
- Financial and Insurance Mathematics
- Stochastic Analysis & Stochastic Optimal Control
- Stochastic Optimization and Applied Probability Theory

Schedule & Teaching Method & Teaching material

- **Lecture-Videos:** Recorded videos on NTULearn available
- **Lecture notes:** available on NTULearn and on my webpage
  www.ntu.edu.sg/home/ariel.neufeld
- We shall have lectures followed by exercises after each chapter, whose solutions are available in the lecture notes
- **Physical Lecture ("Summary of the week's topic") & Tutorial:**
  - **Friday 10:30-12:30 at SPMS-LT1** (recorded)
  - voluntary to attend (but recommended)

- 45-60 min summary & discussion of this week's topic, followed by
- 30-45 min of discussion of the homework/exercise, followed by
- 15-30 min of question times

Remark: If there is an exercise you would like me to explain more in detail, please send me an email and I can explain it to you and/or make a video for everyone available

Knowledge requirement: MH2500 (Introduction course to probability)

Help (repetition of MH2500): Chapter 1 of lecture notes

Recommendation: Solve as many exercises as possible

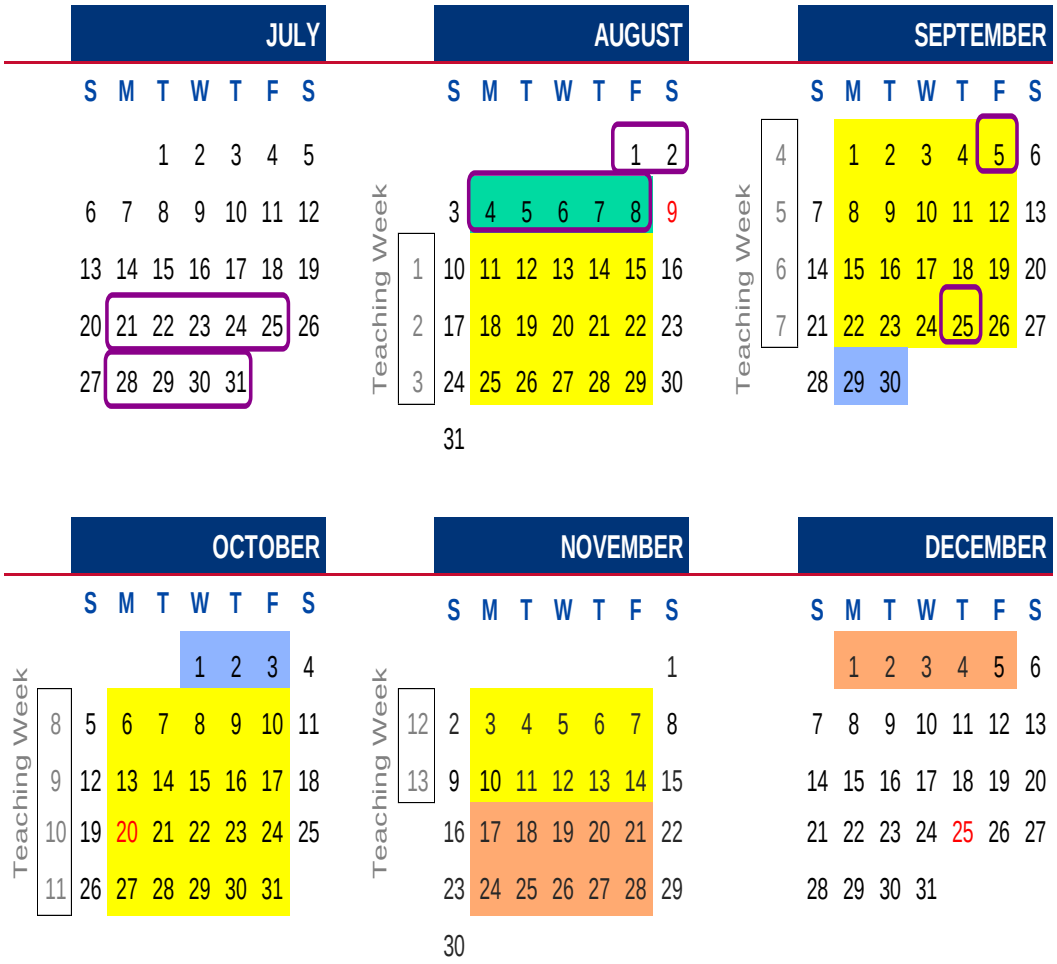
Learning subjects

- Part I: Gambling Problems (1 week; Week 1)
- Part II: Random Walks (1 week; Week 2)
- Part III: Discrete-time Markov Chains (1 week; Week 3)
- Part IV: First Step Analysis (1 week; Week 4)
- Part V: Classification of States (1 week; Week 5)
- Part VI: Long-Run Behavior of Markov Chains (1 week; Week 6)
- Repetition week (1 week; Week 7)
- Mid term exam (1 week; Week 8)
- Part VII: Discrete-Time Martingales (1 week; Week 9)
- Part VIII: Branching Processes (1 week; Week 10)
- Part IX: Continuous-time Markov Chains (2 weeks; Week 11-12)
- Repetition week (1 week; Week 13)

Semester Dates

SEMESTER 1

2025



LEGEND

- University Orientation Week
- Teaching Week
- Recess Week
- Revision and Examination

UNIVERSITY KEY EVENTS

Convocation	22 Jul - 2 Aug 2025 (To Be Confirmed)
UG Freshmen Orientation	21 Jul - 8 Aug 2025
UG Qualifying English Test	1 Aug 2025
University Welcome	5 - 6 Aug 2025
State of the University Address	25 Sep 2025
Students' Union Day	5 Sep 2025

Indicative assessment

1. Midterm Exam: 25%
   - 2 hours
   - Closed book (= **no notes**)

   Date & time: Friday 10. October, 10:30-12:30

   Location: **Hall C**

   Remark: Everyone is required to attend

2. Homework: 25% **Date : TBA** (after midterm exam)

   Remark: Everyone is required to solve it him/herself

3. Final exam: 50%
   - 2 hours
   - Closed book (= **no notes**)

   Date & time: **TBA** **Location:** **TBA**

Questions

- If you have any questions, please feel free to contact me per email or in person during tutorial class on Friday

My **email** address: ariel.neufeld@ntu.edu.sg

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