

STAT 453/BEPP 453/STAT 853/BEPP 853
ACTUARIAL STATISTICS
Fall 2017

Reading material:

Poisson Models:

Either Study note from the Society of Actuaries: Daniel “Poisson Processes and mixture distributions” (in course pack)

Or S. Ross: “Introduction to Probability Models”. 6th or later edition, Academic Press

Aggregate Loss Models:

Klugman, Panjer, Willmot: “Loss Models: From Data to Decisions”. Second, third, or fourth edition, John Wiley (bookstore or Lippincott reserve)

Markov Chains:

Study note from the Society of Actuaries: Daniel: “Multi-State Transition Models with Actuarial Applications” (in course pack)

Course pack: www.study.net. Password: INSR2010

Office hours: Tuesdays, 4:30-5:45; Thursdays, 12:30 – 1:30; and by appointment, JMHH 458 (lemaire@wharton.upenn.edu)

Note: If you hit “**Reply**” to an e-mail from me to the class, you are replying to the whole class

Syllabus

Poisson Models

Lesson 1 (8/29):	The Poisson process
Lesson 2 (8/31):	The distribution of waiting times
Lesson 3 (9/5):	Thinning. Non-homogeneous Poisson processes
Lesson 4 (9/7):	The Compound Poisson process I
Lesson 5 (9/12):	The Compound Poisson process II
Lesson 6 (9/14):	Mixed Poisson processes
Lesson 7 (9/19):	Mixed Poisson processes
Lesson 8 (9/21):	Applications
Lesson 9 (9/26):	Applications

Aggregate Loss Models

Lesson 10 (9/28)	The compound model
Lesson 11 (10/3):	Convolution of two random variables
Lesson 12 (10/10):	The moments of aggregate losses

- Lesson 13 (10/12): Normal approximations I
- Lesson 14 (10/17): Normal approximations II
- Lesson 15 (10/19): Net stop loss premiums
- Lesson 16 (10/24): Examples

Markov Chains

- Lesson 17 (10/26): Definition of a Markov Chain
- Lesson 18 (10/31): Chapman – Kolmogorov equations
- Lesson 19 (11/2): **Mid-term on Poisson Models and Aggregate Loss Models**
Open book, with SoA calculator. You may have in class: textbooks, your class notes, a few pages with formulas. You may not have in class: ACTEX manuals or any other material. Exam counts for 50% of grade
- Lesson 20 (11/7): The stationary distribution
- Lesson 21 (11/9): Examples: Gambler's ruin and credit scoring
- Lesson 22 (11/14): Application to genetics
- Lesson 23 (11/16): Example: Bonus-Malus systems in automobile insurance
- Lesson 24 (11/21): Present value of cash flows in Markov Chains
- Lesson 25 (11/28): Examples: Continuing care retirement community and Chinese Bonus-Malus System
- Lesson 26 (11/30): Continuous Markov Chains.
- Lesson 27 (12/5): Continuous Markov Chains
- Lesson 28 (12/7): Application to Genetics

Final exam on Markov Chains. Monday December 18, 12:00 – 2:00. (50% of grade):
Same rules as mid-term.

Solutions to most course pack questions: www.soa.org. Click on Education and Exams, Past Exam and Solutions.

You will need a calculator (TI BA II PLUS or equivalent) for the mid-term and the final. To be fair to all students, a calculator that multiplies matrices is not permitted for the final exam.