

STAT 453/BEPP 453/STAT 853/BEPP 853  
ACTUARIAL STATISTICS  
Academic Year 2013-2014

**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”. 6<sup>th</sup> 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](http://www.study.net). Password: INSR2010

**Office hours:** Tuesdays and Thursdays, 12:30-1:30, Tuesdays 4:30-5:30, 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 (9/3):	The distribution of waiting times
Lesson 3 (9/5):	Thinning. Non-homogeneous Poisson processes
Lesson 4 (9/10):	The Compound Poisson process I
Lesson 5 (9/12):	The Compound Poisson process II
Lesson 6 (9/17):	Mixed Poisson processes
Lesson 7 (9/19):	Applications

Aggregate Loss Models

Lesson 8 (9/24):	The Compound model
Lesson 9 (9/26):	No class
Lesson 10 (10/1):	Convolution of two random variables
Lesson 11 (10/3):	The moments of aggregate losses
Lesson 12 (10/8):	Normal approximations I

- Lesson 13 (10/15): Normal approximations II
- Lesson 14 (10/17): Net stop loss premiums
- Lesson 15 (10/22): Examples

### Markov Chains

- Lesson 16 (10/24): Definition of a Markov Chain
- Lesson 17 (10/29): Chapman – Kolmogorov equations
- Lesson 18 (10/31): **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 19 (11/5): The stationary distribution
- Lesson 20 (11/7): Examples: Gambler's ruin and credit scoring
- Lesson 21 (11/12): Application to genetics
- Lesson 22 (11/14): Example: Bonus-Malus systems in automobile insurance
- Lesson 23 (11/19): Present value of cash flows in Markov Chains
- Lesson 24 (11/21): Examples: Continuing care retirement community and Chinese Bonus-Malus System
- Lesson 25 (1/26): Continuous Markov Chains.
- Lesson 26 (12/3): Continuous Markov Chains
- Lesson 27 (12/5): Application to Genetics

**Final exam on Markov Chains** (50% of grade): Thursday, December 19, 12:00 – 2:00.  
Same rules as mid-term.