

STAT 453/BEPP 453/STAT 853/BEPP 853  
ACTUARIAL STATISTICS  
Fall 2016

**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, 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 (8/30):	The Poisson process
Lesson 2 (9/1):	The distribution of waiting times
Lesson 3 (9/6):	Thinning. Non-homogeneous Poisson processes
Lesson 4 (9/8):	The Compound Poisson process I
Lesson 5 (9/13):	The Compound Poisson process II
Lesson 6 (9/15):	Mixed Poisson processes
Lesson 7 (9/20):	Mixed Poisson processes
Lesson 8 (9/22):	Applications
Lesson 9 (9/27):	Applications

Aggregate Loss Models

Lesson 10 (9/29)	The compound model
Lesson 11 (10/4):	Convolution of two random variables
Lesson 12 (10/11):	The moments of aggregate losses

- Lesson 13 (10/13): Normal approximations I  
Lesson 14 (10/18): Normal approximations II  
Lesson 15 (10/20): Net stop loss premiums  
Lesson 16 (10/25): Examples

### Markov Chains

- Lesson 17 (10/27): Definition of a Markov Chain  
Lesson 18 (11/1): Chapman – Kolmogorov equations  
Lesson 19 (11/3): **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 (11/8): The stationary distribution  
Lesson 21 (11/10): Examples: Gambler's ruin and credit scoring  
Lesson 22 (11/15): Application to genetics  
Lesson 23 (11/17): Example: Bonus-Malus systems in automobile insurance  
Lesson 24 (11/22): Present value of cash flows in Markov Chains  
Lesson 25 (11/29): Examples: Continuing care retirement community and Chinese  
Bonus-Malus System  
Lesson 26 (12/1): Continuous Markov Chains.  
Lesson 27 (12/6): Continuous Markov Chains  
Lesson 28 (12/8): Application to Genetics

**Final exam on Markov Chains. Wednesday, December 21, 12:00 – 2:00** (50% of grade): Same rules as mid-term.

Solutions to most course pack questions: [www.soa.org](http://www.soa.org). Click on Education and Exams, Past Exam and Solutions. Find exam session and click Solutions.