STAT 453/BEPP 453/STAT 853/BEPP 853
ACTUARIAL STATISTICS
Fall 2019

Reading material:

Klugman, Panjer, Willmot: "Loss Models: From Data to Decisions", 4th ed., John Wiley
(bookstore or Lippincott reserve). Chapters 8 and 9.

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

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

Dickson, Hardy, Waters: Actuarial Mathematics for Life Contingent Risks, 2nd ed.,
Chapter 8, 8.1 – 8.7.

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

Office hours: Tuesdays and Thursday, 1:00-2:45, 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

1. <u>Poisson Models</u>

Lesson 1 (8/27):   The Poisson process
Lesson 2 (8/29):   The distribution of waiting times

2. <u>Aggregate Loss Models. The Compound Poisson Process</u>

Lesson 3 (9/3):   The collective risk model. The Compound model
Lesson 4 (9/5):   Convolutions. The Compound Poisson model
Lesson 5 (9/10):   Calculation of moments
Lesson 6 (9/12):   Normal approximations
Lesson 7 (9/17):   Conditional expectations
Lesson 8 (9/19):   Special cases

3. <u>Coverage modifications</u>

Lesson 9 (9/24):   Regular deductibles
Lesson 10 (9/26)   Stop loss premiums
Lesson 11 (10/1):   Stop loss premiums II
Lesson 12 (10/3):   Policy limits

10/8 class cancelled
Lesson 13 (10/15):   The loss elimination ratio
Lesson 14 (10/17):   Inflation
Lesson 15 (10/22):   Applications

4. The mixed Poisson process

Lesson 16 (10/24):   Mixed distributions
Lesson 17 (10/29):   Applications of Bayes theorem

10/29, 6 pm: **Mid-term on first three parts** (50% of grade)
                 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

5. Markov Chains

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

Final exam on parts 4 and 5 (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, graphing calculators or calculators that multiply
    matrices are not permitted for the final exam.