



STAT 451/BEPP 451
STAT 851/BEPP 451
Fundamentals of Actuarial Science
Prof. J. Lemaire
Fall 2012

Textbooks: S. Broverman: Mathematics of Investment and Credit (Bookstore)
Dickson, Hardy, Waters: Actuarial Mathematics for Life Contingent
Risks (Bookstore)

Additional notes: Free download from

[http://www.cambridge.org/gb/knowledge/isbn/item2703201/?site_locale=en_GB&dis
play=genresources&anchor=true](http://www.cambridge.org/gb/knowledge/isbn/item2703201/?site_locale=en_GB&display=genresources&anchor=true)

Course Pack: www.study.net.

Office hours: Tuesdays, Thursdays 12:30-1:30, Tuesdays 4:30-5:30, and by
appointment (lemaire@wharton.upenn.edu) SH-DH 3404

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

Homework: Homework problems, to be found in the course pack, are to be turned in
four times during the course.

Review classes: Optional review classes, every other week, Mondays, 4:30 – 6:00.
Instructor: Yun Zhang, yunzhang@wharton.upenn.edu

Lesson 1: Introduction to the actuarial science program
9/6

Lesson 2: The measurement of interest: interest accumulation and
9/11 effective interest rates. Present value and equation of value BR 1.1-1.2

Lesson 3: Nominal rates of interest. Effective and nominal rates
9/13 of discount BR 1.3-1.4

Lesson 4: The force of interest. Inflation
9/18 BR 1.5-1.6

Lesson 5: Level payment annuities
9/20 BR 2.1

Lesson 6: 9/25	Some generalizations	BR 2.2
Lesson 7: 9/27	Annuities with non-constant payments	BR 2.3
Lesson 8: 10/2	No class	
Lesson 9: 10/4	No class	
Lesson 10: 10/9	Loan repayment: Amortization method Homework due: K1-1, K1-3, K1-11, K1-12 K3-3, K3-11, K3-15, K3-20	BR 3.1-3.2
Lesson 11: 10/11	Truth in Lending	
Lesson 12: 10/16	The Sinking Fund method. Applications	BR 3.3
Lesson 13: 10/18	Applications End of mid-term material	BR 3.4
Lesson 14: 10/25	Bonds pricing	BR 4.1
Lesson 15: 10/30	Bond amortization. Callable bonds Homework due: K5-2, K6-1, K6-5, K6-6	BR 4.2 – 4.3.1
Lesson 16: 11/1	Internal rate of return Dollar-weighted and time weighted rate of return Suggested reading:	BR 2.4.1, 5.1 BR 5.1.3, 5.3.1
Lesson 17: 11/6	Spot rates, forward rates, duration	BR 6.1, 6.3, 7.1

Mid-term exam: You can choose November 6 or November 7, 6:00 pm.

Lesson 18: 11/8	Duration, Immunization	BR 7.2
Lesson 19: 11/13	Survival Models	D2

Lesson 20: 11/15	Survival models	D2
Lesson 21: 11/20	Life tables	D3
Lesson 22: 11/27	Assumptions for fractional ages	D3
Lesson 23: 11/29	Select tables Homework due: B3-1-3, B3-1-4, B3-3-6, B3-4-3 Check remark below about the use of tables	D3
Lesson 24: 12/4	Whole life insurance	D4
Lesson 25: 12/6	Term insurance. Other life insurance policies Homework due: B4-2, B4-3, B4-6, B4-10	D4

Final Exam: During exam week, no date yet

Homework is individual work. Homework questions are found in the course pack (not textbook exercises). You are not to discuss homework with other students. Some homework questions require the use of an Illustrative Life Table. Two such tables are provided in the course pack: an “old” table ($i=5\%$), for all problems that begin with the letter B, and a “new” table ($i=6\%$), for problems downloaded from the Society of Actuaries’ web site.

You need to bring a calculator (SoA or equivalent) to the mid-term and final exam. You are not expected to know financial functions on the calculator. You may bring your class notes, the textbooks, and a few pages of hand-written formulas. The final is non-cumulative.

Final grade: 20% homework, 40% mid-term, 40% final

The material for the mid-term and the final exam is the material taught in class, not the material of SoA exams. Much more than 95% of the SoA material for exams FM and MLC is covered in INSR classes. For the compound interest part, material covered in class that is not part of SoA exam FM consists of Truth-in-Lending and applications. Consequently, these parts are included in the INSR 251 mid-term.

Answers to course pack questions dated 2000 and later can be found in the SoA website: www.soa.org. A grid with answers to earlier questions is in the course pack.