

Useful Preparatory Material for M.Sc. in Actuarial Science

Required Courses

Typically, Actuarial Science M.Sc. students take Statistical Theory and the ACMA 8xx course(s) offered in their first semester at SFU.

Review of the following material prior to starting these courses may prove useful.

1. Statistical Theory (STAT-830)

- Course information, slides, and notes from Fall, 2013:
http://people.stat.sfu.ca/~lockhart/richard/830/13_3/index.html
- The probability sections of *Introduction to Mathematical Statistics* by Hogg, McKean, and Craig
- Chapters 1--3 of *Probability and Statistics* by Evans and Rosenthal
- Chapters 1--3 of *All of Statistics* by Wasserman. Also, it will likely be assumed that you can do the following problems in this book:
 - Chapter 1: Questions 5, 10-15, 17, 19, 20
 - Chapter 2: Questions 2, 4, 5, 9, 13, 14, 16-18, 20, 21
 - Chapter 3: Questions 1, 3, 4, 5, 10, 12-18, 21-24

2. Stochastic Models of Retirement Income (ACMA-850 G100)

Students should be familiar with basic probability (random variables, common probability distributions, expectation, bivariate distributions, conditioning and independence, transformations of random variables, Jensen's Inequality), discounting and present values.

- Chapters 1-4 of *All of Statistics* by Wasserman
- Chapters 1-2 of *Theory of Interest* by Kellison

3. Modelling of Actuarial Risks (ACMA-850 G200)

Students should be familiar with the pricing of traditional life and annuity products (including associated actuarial notations), Buhlmann credibility theory, Bayesian theory, conditional probability, conditional expectation, and simple linear regression.

- Chapters 2-7 of *Actuarial Mathematics for Life Contingent Risks*, 2nd Edition by Dickson, Hardy & Waters.
- Chapters: 17-18 of *Loss Models: From Data to Decision*, 5th Edition by Klugman, Panjer and Willmot.

4. Advanced Actuarial Models (ACMA-850 Special Topics to be offered in Spring 2020)

Students should know the commonly used distributions for the number of claims and the severity of claims and their basic properties, the definition of $(a,b,0)$ and $(a,b,1)$ classes of distributions and their properties, the distribution of sums of independent random variables (including the use of convolution), and the compound models for aggregate claims especially the compound Poisson model. Students should also know the Poisson process and its basic properties, credibility theory, commonly used estimation methods such as the maximum likelihood estimation method, and simple linear regression models.

- Chapters 6, 8,9 and 18 of *Loss Models: From Data to Decision*, 4th Edition by Klugman, Panjer and Willmot.

Additional Material

- You will likely be using R (and potentially SAS as well) for statistical computing purposes. It would be helpful to learn the basics of the software before arriving. R can be freely downloaded at <http://www.r-project.org>
- You will likely be using LaTeX for writing technical documents (including your M.Sc. project). A basic understanding of how to use this software will be beneficial.
- If you will be a TA in the Statistics Workshop, review introductory statistics material (including linear regression) so that you are prepared to support students taking STAT 101, 201, 203, 270, and 302.
- The book *Introduction to Mathematical Statistics* by Hogg, McKean, and Craig may be helpful for learning (or re-learning) introductory material.